Final report

OWMC
Ontario
Waste Management
Corporation

A provincial crown corporation.

ecologistics
limited

Deloitte
Haskins+Sells Associates

SITE SELECTION PROCESS

PHASE 3B: SELECTION OF CANDIDATE SITES

Agriculture

ECOLOGISTICS LIMITED

AND

DELOITTE, HASKINS AND SELLS ASSOCIATES

OCTOBER 31, 1984

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October 31, 1984

Dr. B.D. Mitchell
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Dear Sir:

Re: Final Report: "SITE SELECTION PROCESS - PHASE 3B:
SELECTION OF CANDIDATE SITES - Agriculture

We are pleased to forward herewith our final report for the above-noted study. Maps accompanying this report are included in the "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Technical Data Map Portfolio."

The report documents the analysis of agricultural factors during Phase 3B of the site selection process.

We are pleased to have been of service.

Yours very truly,

ECOLOGISTICS LIMITED

DR Cressman

D.R. Cressman, M.Sc., P.Ag.
President

DRC/vw

Enclosure

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EXECUTIVE SUMMARY

PURPOSE OF THE REPORT

The purpose of this report is to document the process by which information on agriculture was developed for use in the Ontario Waste Management Corporation site selection process as it progressed from candidate areas to candidate sites. This builds upon the agricultural analysis that was applied during the previous stage when candidate areas were identified.

Presented in this report are the factors used to address agricultural concerns, the rationale for and significance of these factors, data sources, methods of analysis, results, and application of the factors to the site selection process.

SCOPE AND METHOD

Throughout the site selection process, the perspective taken in dealing with agricultural concerns has been to minimize impacts on agricultural

resources—impacts on land capability, agricultural economic systems and agricultural communities.

The selection of agricultural factors was guided by the overall site selection objectives. The principal objective of the agricultural study was "to minimize the impact on agricultural resources." Because of the connection through food chain linkages between agriculture and human health, another relevant objective is to "minimize risk to human health."

Specific guidance in the choice of factors came from the Government of Ontario's "Foodland Guidelines" which is a policy statement on planning for agricultural resources. Also, input was obtained from meetings with representatives of several provincial-level farm organizations, from the Ontario Ministry of Agriculture and Food and from OWMC sponsored public workshops at the identification of site areas stage.

Factors and study methods were also influenced by a review of other site selection methodologies that incorporate agricultural considerations. Where deficiencies in existing site selection methods were observed, original research was conducted by Ecologistics Limited, with guidance from acknowledged experts.

The three steps in the site selection process that are documented in this report include:

1. identification of site areas;
2. identification of potential sites; and
3. identification of candidate sites.

As the study progressed step-wise from the large candidate areas down to candidate sites, the choice and treatment of factors were refined. The families of factors employed at each stage in the site selection process are shown below. As much as possible, continuity among factors was maintained from one stage to the next.

SUMMARY OF AGRICULTURAL FACTORS

Site Selection Stage		
Identification of Site Areas	Identification of Potential Sites	Identification of Candidate Sites
Soil capability	Soil capability	Soil capability
Agricultural cropping systems	Farm building complexes	Farm building complexes
		Cultivated land
Urban shadow	Urban shadow	Land fragmentation (Urban shadow)
Designated industrial and residual urban land	Designated industrial and residual urban land	Designated land use
Publicly-owned land	Publicly-owned land	Publicly-owned land
-	-	Sensitive crops
-	-	Livestock

When identifying site areas, it was necessary to employ data that were general in nature and consistent with a 1:50 000 scale of base mapping. During the subsequent two stages, when site areas and potential sites were examined at a 1:10 000 scale, the level of detail in the data base and the number of factors were increased.

PREMISES AND POSTULATES

PREMISES

The approach to data collection established with OWMC was that only secondary sources of data and data that could be collected from roadside surveys would be utilized during the three stages of study. This did not prove to be a constraint on the completion of the work.

Because several aspects of the agricultural impact analysis methodology required development during the study, OWMC agreed that the agricultural consultant should meet with representatives of provincial level agricultural organizations and with the Ministry of Agriculture and Food to discuss matters related to methodology. As well, in certain areas such as the development of the urban shadow factor, leading experts in this field of study within Ontario were to be consulted.

POSTULATES

The basic postulate of the study was that agricultural concerns are best addressed within a perspective that seeks to minimize impacts on the agricultural production system. Accordingly, impacts to land, economic systems or people involved in agriculture could have negative ramifications on the agricultural resources in a community.

For the initial assessment of crop sensitivity, OWMC directed that the initial work of IEC Beak Ltd. on environmental toxicology and the ongoing work of the Ontario Research Foundation on potential emissions and air dispersion should provide working assumptions about the possible nature of airborne emissions.

During the analysis, data on non-farm land uses (residences), land use designations, publicly-owned land and property boundaries were obtained from the OWMC land use consultants (Marshall Macklin Monaghan Limited).

STATUS OF THE DATA

The underlying objective in selecting data sources was to obtain the most recent data that is uniformly available for the study areas and is relevant in content and scale to each stage of study.

As much as possible, commonly used published data sources, such as the Census of Agriculture, were used. When it was necessary to employ a data set that was relatively new, with limited application to-date in site selection studies, field checks were carried out to establish the accuracy.

To further assist in establishing the suitability of various data types and sources, discussions were held with the Ontario Ministry of Agriculture and Food and representatives of provincial-level farm organizations.

More specific information on the data used in each stage appears in the findings section of this summary.

MAIN FINDINGS

IDENTIFICATION OF SITE AREAS

The objective of this stage was to exclude portions of the candidate areas considered most unsuitable for OWMC facilities and leave site areas for more detailed study.

Factors

The choice of factors and data was influenced by the fact that agriculture is the predominant land use within the candidate areas. It was, therefore, essential that the data, when mapped, be able to help shrink the study areas to smaller units that approximated the size of sites.

The three agricultural factors considered were: soil capability, agricultural cropping systems and urban shadow influences.

Soil capability was chosen as the primary agricultural factor. Soil capability was considered more important than existing agricultural land uses, except in the case of lands situated in urban shadow areas. This acknowledges widespread concern among the general public and government that the best agricultural lands be preserved for the future when demands for agricultural products will substantially increase. The tendency should always be to avoid lands of high soil capability, except in urban shadow areas.

Agricultural cropping systems are indicative of the level of utilization of rural lands for agriculture as they indicate current levels of investment in production facilities and land improvements. Removal of lands for OWMC facilities which are currently in intensive agricultural uses would entail a waste of existing investments, displacement of farm families and a reduction in agricultural contributions to local economies.

The more intensive cropping systems should, therefore, be avoided wherever possible.

Urban shadow areas are locations where the pressures of urbanization have sufficiently altered land ownership patterns and the composition of the agricultural community to place the long-term viability of commercial agriculture in doubt. The general preference expressed at OWMC public workshops and by representatives of agricultural organizations was to retain urban shadow lands for consideration as candidate sites, even if there are higher capability soils.

Although not treated explicitly as factors, designated industrial and residual urban* lands and publicly-owned land, identified as factors by the land use consultant, were considered in the application of the agricultural constraints with the non-agricultural constraints.

Data base

The traditional source of soil capability information, i.e. Canada Land Inventory 1:50 000 scale manuscript maps, have substantial limitations within the study area. Most of the mapping is based on outdated soil

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*Urban residual lands are undeveloped lands within the urban or hamlet development envelopes defined in Regional Official Plans but not designated for urban uses in area municipality Official Plans.

survey information. In such cases, new capability maps were developed in consultation with the Ontario Institute of Pedology (OIP) using its most recent (1977-1984) but unpublished soil maps.

Information on existing agricultural cropping activity was obtained from Agricultural Land Use Systems maps produced by Agriculture Canada and the Ontario Ministry of Agriculture and Food (OMAF). Since these maps have not been widely used in site selection studies, a field check of their accuracy was carried out in several portions of the study area. In over 80 percent of the areas checked, the mapping matched the 1983 crop rotations observed in the field. Considering the normal shifts from one year to the next in crop rotations, this level of accuracy is considered quite acceptable.

Urban shadow areas were delineated in a special study carried out as part of this project and summarized in the text. The data came from the 1981 Census of Agriculture and the 1981 Population Census. They were obtained for, and displayed at the lowest level of aggregation—the enumeration area (E.A.). Typically, a township may contain six or more E.A.'s. This level of detail is satisfactory for deciding upon areas that should be retained for more detailed study. For the purposes of comparing individual sites, more detailed data can be obtained at the site level.

The indicators chosen for defining and mapping urban shadow areas are:

- percentage of E.A. improved farmland that is rented;
- percentage of E.A. that is not farmed; and
- percentage of E.A. rural population that is classified as rural non-farm.

Mapping of designated industrial lands and publicly-owned lands was supplied by the OWMC land use consultant, Marshall Macklin Monaghan Ltd.

Data analysis results

The constraint mapping identified high constraint areas consisting of specialty crops, Class 1 or 2 land and Class 3 or 4 land under intensive agricultural uses. Low constraint areas were soils of Capability Class 5, 6 or 7 and Class 3 and 4 soils in low intensive agricultural or non-agricultural uses. In the ranking of factors, Class 3 and 4 lands under certain cropping systems were treated separately. To accomplish this, reference was made to the soil capability for agriculture mapping.

All designated industrial lands, urban residual lands, publicly-owned lands and urban shadow areas were ranked as low constraint, irrespective of soil capability class and existing agricultural uses. As a result of merging agricultural with non-agricultural constraints, 152 site areas were identified.

IDENTIFICATION OF POTENTIAL SITES

The purpose of this stage in the process was to reduce the size and number of constraint-free areas identified in the previous stage. This stage consisted of two steps.

Step one served as a check on the results of the constraint mapping. All site areas were re-examined in light of the original 1:50 000 scale data used in the development of the constraint map. Site areas were either dropped from further consideration or reduced in size if they contained, in whole or in part, high constraint map units.

In the second step, individual site areas were examined in more detail at a 1:10 000 scale. Most of the factors and data used in the previous stage were again applied and one new factor and field data were introduced.

Factors

In the second step, the factors and data for soil capability, urban shadow, designated land use and publicly-owned land were utilized. Farm building complexes replaced cropping systems as an indicator of investment in production facilities. Farm building complexes were rated on a scale from above average to below average based on a combination of size and condition. Preference was given to commercial agricultural operations over hobby and horse farm operations.

In the ranking of factors, a system was developed for rating site areas as very good, good, fair or poor in terms of total agricultural impact. A rating matrix was developed for combining the agricultural factors. Greater weight was placed on the soil capability factor than on investments in farm building complexes. All site areas situated in industrially designated areas, publicly-owned or urban shadow areas were rated as potentially good sites to be retained for analysis in the next stage (unless they were deleted because of non-agricultural factors). All poor sites were recommended for deletion at this stage of study.

The data base

New data added at this stage was the farm building complex factor. Since data on farm buildings are not available in published mapped form, it was necessary to obtain the data through field inspections. All farm complexes within the site areas and those that appear to be on lands abutting site areas were examined from the roadside and classified on a four scale rating system: 1) above average commercial farm building complexes, 2) average commercial farm building complexes, 3) below average farm building complexes and unused or rundown farm buildings, and 4) hobby and/or horse farms. The accuracy of the data is limited by virtue of the roadside nature of the evaluation. The data for sites undergoing subsequent detailed evaluation can be improved once on-site inspections and operator interviews are carried out.

Data analysis results

During Step 1, the review of 1:50 000 scale data maps and constraint maps resulted in the deletion of seven site areas that contain high agricultural constraints.

During Step 2, the introduction of a farm building complex factor, when combined with the previous factors resulted in a recommendation that 27 site areas be dropped from further consideration because of their agricultural impact potential.

IDENTIFICATION OF CANDIDATE SITES

This stage was intended to explore relative differences among the 17 siting options (8 integrated, and 9 partially integrated) in order to reduce the number of potential sites under consideration.

Factors

Agricultural factors included the previous ones of soil capability, farm building complexes, urban shadow, designated land use and publicly-owned land. Also included as factors were the area of cultivated land, values of sensitive crops and livestock populations.

Soil capability was expressed differently than in previous stages. For the potential site areas, the area of soils equivalent to Class 1 soils was calculated. This method allows one to compare candidate sites of similar size, which contain a mix of capability classes.

The predominant soil capability classes in the areas adjacent to candidate sites were also estimated.

Farm building complexes were treated as in the identification of potential sites. With the introduction of data on property boundaries it was possible to predict which farm building complexes are associated with lands in: a) the site acquisition areas, or b) specified zones around incinerator and landfill site boundaries.

Cultivated land was introduced as a subset of the cropping systems information used in the constraint mapping. Together with the farm building data, it demonstrates the degree of intensity of present agricultural land use. The area of cultivated land in each potential site area was determined from the cropping systems maps. Where two sites have similar soil capabilities and are otherwise similar, but one contains more scrub or bush than the other, the former would be preferred as a site.

Land fragmentation was introduced as a refinement of the previous urban shadow factor. Indicators for the factor were the number of land parcels less than 20 ha in size and the number of non-farm residences. Parcels smaller than 20 ha seldom support commercially viable farm enterprises and are difficult for farmers to assemble and operate efficiently on a lease basis. Non-farm residences raise the prospect of nuisance complaints and interference with normal farm operations. Areas with a high preponderance of these two indicators are preferred as sites.

Designated land uses included designated "industrial lands," "special policy areas" and "residual urban" as well as areas designated "agricultural" and "rural." The special policy areas include lands for which the municipality is in the process of preparing a secondary plan and redesignating the lands to "industrial." The preference is to first avoid areas designated agricultural and rural. Preference is given to potential sites which are designated industrial or as special policy areas.

Publicly-owned land was again used as a factor. Such lands may be appropriate for OWMC facilities since their use would not remove land from private agricultural ownership and thus, with other factors being equal, would have less impact on agricultural resources.

The sensitive crop factor relates to the potential impact on crop quality and yields, and risks to human health via the food chain if such crops are exposed to emissions of toxicants at damage producing levels. Those crops which are potentially the most sensitive to the types of substances that might be emitted were identified. The value of such crops grown within a 5 km radius of each incinerator site was estimated. Preference should be for sites with the lowest sensitive crop value in the zone of influence.

Livestock, as a factor, also relates to the potential impacts of emissions on the food chain. Livestock exposed to harmful emission levels could be in danger of health and/or performance impacts. Therefore, the tendency should be to select sites which have low livestock population densities in their zone of influence.

The data base

The soil capability, cultivated land, farm building complexes, designated land use and public-land ownership information came from the sources discussed previously. In the portion of Niagara Region, known formerly as Welland County, where the OIP has not completed its remapping, soils information was upgraded for the candidate site areas through borings along road allowances. More detailed field checking of soils will be required for all sites at the next stage of study.

Sensitive crop data were taken from several sources. The occurrence of crops which are considered potentially sensitive to airborne emissions was determined from the 1981 Census of Agriculture at the E.A. level, while five-year average yields and price levels were obtained from OMAF annual crop statistics (1978-82). In both cases, this is the best available information and is considered quite acceptable for use at this stage.

A livestock and poultry population density value was calculated for each E.A. using data from the 1981 Census of Agriculture. Population was expressed on the basis of total units per 40 ha of farmland.

Data analysis results

Factors and factor groupings were ranked so that the 17 siting options could, in turn, be ranked in one of four levels. The resulting ranking was as follows:

Level 1 (most suitable)	- LF-3E; LF-1C/PI-18E; LF-2N/PI-1A1; LF-1E/PI-27E
Level 2	- LF-1E; LF-10W/PI-2W; LF-11W/PI-2W; LF-2N/PI-1N; LF-2N/PI-13N
Level 3	- LF-10W; LF-11W; LF-4N; LF-4N/PI-1N; LF-4N/PI-13N
Level 4 (least suitable)	- LF-3C; LF-8C; LF-9C

Among the Level 1 siting options, LF-2N/PI-1A1 was considered by far the best option from an agricultural point-of-view. Those siting options identified as least desirable because of potentially serious agricultural impacts are LF-8C, LF-9C and LF-3C.

CONCLUSIONS AND RECOMMENDATIONS

The results of the foregoing analyses indicate that significant differences exist among several of the potential sites from an agricultural perspective. The optimum siting combination from an agricultural perspective is LF-2N/PI-1A1 where the land base, despite its current agricultural use and its Class 1 soils, is designated and proposed for industrial use and is situated within urban shadow areas. Also, the potential access road impacts are significantly lower for this than for any other alternative. Closely rated in suitability from an agricultural perspective are siting options LF-1E/PI-27E and LF-1C/PI-18E.

Those siting options which could potentially have the greatest impacts on agriculture are LF-8C, LF-9C and LF-3C. They contain arable land (Classes 2, 3 and 4), are actively used for agriculture, have the highest impact potential along regional access roads and are situated in areas that are dominated by agricultural uses with relatively few non-farm influences

Sensitive crops and livestock values in the 5 km radii of the sites are very high. LF-8C is considered the least suitable of the three because it has the highest sensitive crop values and farm building ratings.

The remaining siting options have been ranked in one of two intermediate levels. However, it was not possible to rank the options within each level. Until data can be collected from farm operators and the land ownership and leasing situation determined, further ranking of the remaining sites cannot be justified on agricultural factors alone. The required data for completing the comparison will be obtained during the Detailed Comparative Evaluation during Phase 4A.

It is recommended that during Phase 4A, the quality of soils within the potential sites be checked. From the agricultural climate viewpoint there should be an assessment of the differences among the potential sites relative to their influence on crop yield potential of the soils.

Also, data on the types of crops and livestock populations within the zones of influence of incinerator sites and along access roads should be obtained from field surveys to supplement the existing data from the 1981 Census of Agriculture.

CHAPTER 1

INTRODUCTION

This report addresses the approach followed in analyzing agricultural factors in the selection of candidate sites for OWMC's waste treatment and disposal facilities. Consideration of the agricultural factor was first introduced into the site selection process during the identification of candidate areas. This report presents the results of work that was carried out since the candidate areas were identified in the Interim Phase 3 Report in May, 1983.

Throughout the site selection process, the perspective taken in dealing with agricultural concerns has been to minimize impacts on agricultural resources--impacts on land capability, on agricultural economic systems and agricultural communities.

Agriculture is a multi-faceted human activity that occupies most of the landscape in arable regions, is part of a larger biological production system, is a source of employment, adds to the gross national product and is a distinctive way of life. Consequently, there are numerous points in the agricultural production system where farm enterprises and groups of

enterprises or communities could be affected by major non-agricultural developments in rural areas.

Most of the candidate areas are occupied by agricultural land uses and consist largely of Class 1, 2 and 3 soils. In fact, a high proportion of Ontario's prime farmlands are found in the Golden Horseshoe. The emergence of candidate areas in an area of high capability soils is primarily a consequence of the site selection criterion of deep clay soils to protect public health. Such geologic deposits tend to coincide closely with clay soils that have a moderate to high capability for agriculture.

One of the sets of guidelines considered in the site selection process is "Foodland Guidelines, A Policy Statement of the Government of Ontario on Planning for Agriculture."[1] The principal thrust of these Guidelines is to encourage the location of non-agricultural land uses on non-farmlands, wherever possible. However, the Guidelines also recognize that, under certain circumstances and following a prescribed evaluation process, good agricultural lands may be used for non-agricultural purposes.

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[1] Relevant excerpts from the "Foodland Guidelines" are contained in Appendix A.

In circumstances such as those faced by OWMC where most of the candidate areas that meet its hydrogeologic criteria are on Class 1 and 2 land, the Guidelines (Sec 3.11) identify factors in addition to soil capability that may be considered in directing facilities to areas of lower potential agricultural impact. Such factors include existing land fragmentation and rural non-farm development.

The selection of factors for use throughout the site selection process was governed by the following categories of impact to agricultural production systems:

- Impact on land productivity, both present and future.
- Impact on local and regional agricultural economic systems.
- Impact on agricultural communities.

The analysis of impact also took into account the nature of the proposed facilities, their size, operational systems, risk of accidental releases of toxic substances to the environment, etc. The physical-chemical treatment and the incineration components are considered heavy industrial in nature. The landfill component is not a heavy industrial use and would thus be slightly more compatible with rural land uses.

SITE SELECTION GOALS AND OBJECTIVES

Goals and objectives were adopted as a guide to the site selection process; several of these contain references to agricultural impacts. Specific objectives relating to agriculture were identified in the first two of the goal statements which follow in order of priority:

- Minimize risk to human health.
- Minimize environmental impact.
- Minimize financial costs to OWMC.

In each case the objectives relating to agriculture were specific to the site setting and/or the transportation of materials to the site.

MINIMIZE RISK TO HUMAN HEALTH

For the first goal, an objective that relates to pathways into the environment at sites is as follows:

- To site facility components to minimize potential contamination of food chains.

This objective is relevant to agriculture because the handling and incineration of liquid wastes introduce a degree of risk that toxic substances could escape into the environment and cause contamination of food chains. For example, if an accident or malfunction occurred in the

incinerator, toxic substances could enter the atmosphere, be transported to and deposited on crops consumed either directly by humans or by livestock.

A second objective relating to human exposure states:

- To site facility components to minimize the potential for the contamination of existing wells and other sources of water for human and animal consumption.

This objective speaks to the concern that residents and livestock in farm communities as well as livestock be protected from health hazards that could arise if toxic leachate from a site were to migrate into local surface water aquifers and wells.

A third objective of interest to agriculture relates to pathways into the environment associated with transportation and discharge:

- To site facility components such that physical settings along the access routes to the site(s) naturally restrict the movement of contaminants and protect human health, terrestrial and aquatic ecosystems.

This objective would apply to situations such as a truck hauling liquid wastes, which if involved in an accident en route to the treatment facilities, could spill toxic substances that might gain access to a watercourse. If the spill occurred in an agricultural area, cattle watering downstream in the watercourse could ingest the toxicants and thereby contaminate the food chain through milk or meat end products.

Supplemental to the above objectives which quite explicitly address agricultural concerns, are other objectives which relate in a more general sense to the protection of human populations, both agricultural and non-agricultural.

MINIMIZE ENVIRONMENTAL IMPACT

In respect to this second goal, agriculturally-oriented objectives include the following:

- To minimize displacement of prime agricultural soils.
- To minimize displacement and disruption of existing farm enterprises.
- To minimize disruption to productive agricultural areas and to agricultural communities.

The rationale for these objectives is derived from the impact perspective that was discussed at the outset of this chapter.

With the impact perspective, the goals and the objectives in place, the analytical framework was then completed by selecting indicators and data for describing and, wherever possible, measuring the agricultural factors. Ecologistics Limited was responsible for selecting the factors, however, in keeping with OWMC's desire to provide opportunity for input from the public representatives of provincial level agricultural organizations and the Ontario Ministry of Agriculture and Food were consulted about the choice of factors. Persons consulted during this

process are listed in Appendix B. The same groups were also consulted regarding aspects of factor ranking, data sources and data accuracy.

Development of the study methodology and choice of factors was also influenced by a review of relevant literature. A search was carried out for documentation of site selection studies in which agricultural factors had played a significant role. Relevant and acceptable study methods employed elsewhere were utilized or, refined and utilized, in this study. The next section contains a brief summary of the literature review (pg. 10).

The final choice of factors for each stage in the site selection process was governed by the following:

- relevance of potential factors to the agricultural impact assessment framework (land, economy, people);
- scale and quality of available data; and
- relevance to the purpose and scale of each stage in site selection process.

It was recognized that, as the search process moved from broad geographic areas to specific candidate sites, the data for describing factors would need to change. Greater accuracy and precision in the data is needed when the evaluation progresses to specific sites. However, as in the case in the candidate area identification stage, it was possible to carry out most of the identification of candidate sites using existing

information sources. At each stage it was necessary to carry out further analysis of primary data sources and, in some cases to refine the data.

The specific stages in the process of identifying candidate sites are shown in Table 1-1, together with the map scales at which the analyses were performed.

TABLE 1-1

STAGES IN OWMC SITE SELECTION PROCESS

Stage	Mapping Scale
1. Identification of site areas.	1:50 000
2. Identification of potential sites.	1:10 000
3. Identification of candidate sites.	1:10 000 and 1:50 000

The consultant met with representatives of the Ontario Ministry of Agriculture and Food (OMAF), with several province-wide agricultural organizations and also participated in OWMC-sponsored workshops. Two meetings were held with representatives of agricultural organizations to discuss study methodology, factors, data sources and the issue of factor weightings. These discussions covered the work related to the constraint mapping stage of the process.

Meetings with staff of the OMAF Foodland Preservation Branch and with County Agricultural Representatives and/or their staff were held to critically review data maps for the constraint analysis and to identify specific local issues of concern that should be considered.

At the OWMC public workshop sessions in the fall of 1983 and in January, 1984, participants discussed weightings among factors and addressed tradeoff decisions between agricultural and other factors. Input from these workshops was integrated into the final factor rankings.

Also, where original work was required for the development of a particular factor, recognized experts in the relevant disciplinary fields were consulted and their input was utilized in refining the analysis.

This report is organized into three chapters which follow the sequence of stages in the process of selecting candidate sites. Each chapter presents the factors utilized, the rationale for their selection, data

collection and analysis methods, factor rankings, and a discussion of the results of the analysis and its application to the site selection process.

Two separate background reports were also prepared and provide support documentation to portions of the work discussed in this report. Specific references to these reports appear in the relevant chapters.

LITERATURE REVIEW

A literature review was undertaken to identify and assess the available literature on methodologies for siting facilities similar to those being proposed by OWMC. This search dealt exclusively with agriculture, and how agricultural impacts have been considered in site selection processes. Of specific interest was literature that documents impacts to agriculture and criteria for ranking and weighting agricultural variables.

This discussion briefly highlights the main findings that emerged from the literature search and review. A bibliography of materials reviewed is contained in Appendix C. A more complete analysis of the literature has been documented and is on file with the agricultural consultant.

The literature search focused on facility siting processes for sanitary landfills, power generating stations, hydrocarbon facilities, highways, airports, and their associated infrastructure. The literature review began with a key word search of computer data bases. A search of university libraries included agricultural abstracts, indexes, government documents and theses.

In general, the literature search indicated that there are few methodologies of relevance to OWMC that incorporate agricultural concerns in facility siting processes. Most of the literature reviewed describes impacts on farmland from the construction of hydro electric power corridors and oil and gas pipelines.

Of the literature that was deemed most useful the agricultural aspects of OWMC's site selection process, two reports were prominent--An Approach to Classifying and Ranking Ontario's Foodland, 1976 and the Provincial Overview of Generation Siting: The Agricultural Report, 1979. These reports were undertaken by different agricultural groups working with Ontario Hydro. The first report on classifying and ranking foodland provides a ranking system for the importance of various farmland types in the province. The second report deals with impacts of Ontario Hydro's generating stations and develops a ranking system for agricultural variables. Both reports were consulted extensively during the development of the methodology for the agricultural component of OWMC's site selection process.

Considerable literature was reviewed which deals specifically with hazardous waste facility siting. However, very little deals with agricultural concerns or impacts. The extent to which agricultural impacts are mentioned in the literature of site selection, is the commonly stated desire to avoid prime agricultural land.

CHAPTER 2

IDENTIFICATION OF SITE AREAS: CONSTRAINT MAPPING

INTRODUCTION

During the Identification of Site Areas stage a mapping process was carried out in which areas unsuitable for the location of OWMC facilities were identified and then excluded from further consideration. In this process all relevant factors were brought together in a series of map overlays superimposed on the study area base map.

This mapping process was applied within the candidate areas previously delineated by OWMC. Its specific purpose was to identify smaller areas for more detailed study. Because of the size and geographic extent of the candidate areas a scale of 1:50 000 was selected for mapping the factor data on which the constraint analysis was based.

The selection of factors and data was therefore governed by the scale of base mapping and by the need to use data that is up-to-date and consistent across the study area. Of necessity, the factors and data had to adequately represent the analytical framework for agricultural impacts outlined in Chapter 1.

Furthermore, it was necessary that the selected data be of sufficient detail to facilitate shrinking the larger candidate areas to the smaller map units for the candidate sites. Since it was apparent during the candidate area identification stage that agriculture occupies the majority of the candidate areas, the agricultural factors had to play a significant role in shrinking the candidate areas.

In light of the above requirements, the agricultural factors selected were, a) soil capability for agriculture, and b) agricultural cropping systems (see Appendix D for Factor Description sheets). These factors provided the necessary data base at the required scale of mapping and gave an adequate representation of the scope of potential agricultural impacts. Soil capability information addresses the impact to land productivity while cropping systems information addresses, indirectly, the impact to local agricultural economies. Neither, however, addresses the aspect of impact to local agricultural communities.

The latter deficiency became apparent when the soil capability and cropping systems data was initially combined in a first draft constraint map. Review of the resulting map showed problems in areas close to urban centres. While it was known from previous research studies that, in many such areas, the agricultural economy and community have been significantly weakened by the forces of urbanization, the first draft constraint map did not depict this phenomenon. The agricultural cropping systems maps failed to display distinctive patterns that give evidence to this phenomenon.

Consequently, it was determined that an analysis of the urbanization phenomenon should be carried out for the candidate areas. A map of urban shadow areas was thus developed and introduced as the third factor in the mapping of agricultural constraints (see Appendix D).

It was decided that additional factors, industrially designated lands, residual urban and publicly owned lands would be considered in the constraint analysis.[1]

The development of each of these five factors is explained in more detail in each of the following subsections.

FACTORS

SOIL CAPABILITY FOR AGRICULTURE

As was the case in the candidate area identification stage, the Canada Land Inventory (CLI), Soil Capability Classification for Agriculture system was selected as the most appropriate means for assessing the potential impact of OWMC facilities on the agricultural land base. However, with a smaller geographic area to consider at this stage in the site selection process, it became possible to introduce new and more

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[1] Urban residual lands are undeveloped lands within the urban or hamlet development envelopes defined in Regional Official Plans but not designated for urban uses in area municipality Official Plans.

detailed mapping of agricultural soil capability. Thus, the best available information from existing sources was used to examine the agricultural landscape within the candidate areas. The procedures for obtaining and using this information are outlined later in this chapter. Maps are included in the "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Technical Data Map Portfolio."

The CLI classification system[1] was developed by the federal government for evaluating the relative suitability of soils for production of common field crops. Climatic, soil and topographic limitations on the production of field crops are the basis of this seven class rating system. The classes are summarized as follows:

Capability Class	Degree of Limitation for Crop Production	Productivity Indices
Class 1	No significant limitations for common field crop production.	100
Class 2	Moderate limitations for common field crop production.	80
Class 3	Moderately severe limitations for common field crop production.	64
Class 4	Suitable for perennial forage crops and marginal for common field crops.	49
Class 5	Severe limitations that restrict their suitability to perennial forage crops.	32
Class 6	Suitable for pasture.	<32
Class 7	No agricultural capability.	<32

---

[1] The Soil Capability Classification for Agriculture is summarized in Appendix E.

The productivity indices shown above are based on work by Hoffman (1971) and give an indication of the relative productivity potential of soils in each of the capability classes. Class 4 soils, for example, are capable of yielding an average output of common field crops that are 49 percent of the average that can be expected from Class 1 soils.

Organic soils are not included in the CLI Soil Capability Classification system. This data deficiency was overcome by using a separate classification system for organic soils developed by the ARDA program of the federal government. This system, and its accompanying 1:50 000 scale mapping, rank areas of organic soils larger than 20 ha according to their relative potential to produce vegetable crops. There is also no classification system or province-wide mapping of the potential of mineral soils for the production of specialty crops like fruit, vegetables and tobacco. However, at the time of evaluating specific candidate sites, it will be possible to consider the land potential for specialty crops using site-specific criteria that are now available through the Ontario Institute of Pedology.

It is also recognized that there are climatic differences across the candidate areas which may influence the relative potential of different areas for crop production. While the CLI system does consider climate in its rating criteria, the system is not sufficiently refined to accommodate the scale of differences that occur across the candidate region. Therefore, at the detailed comparative evaluation stage, climatic differences will be considered by using more site specific information and

an evaluation system (Land Evaluation Model) developed recently at the University of Guelph.

Data acquisition and compilation

The quality of the available CLI Soil Capability mapping is not uniform and in some areas lacks adequate detail to support a uniform assessment of the candidate areas. New capability maps were therefore compiled from soils information that has become available since the release of the original CLI maps to ensure that the best data sources were utilized. The sources used were:

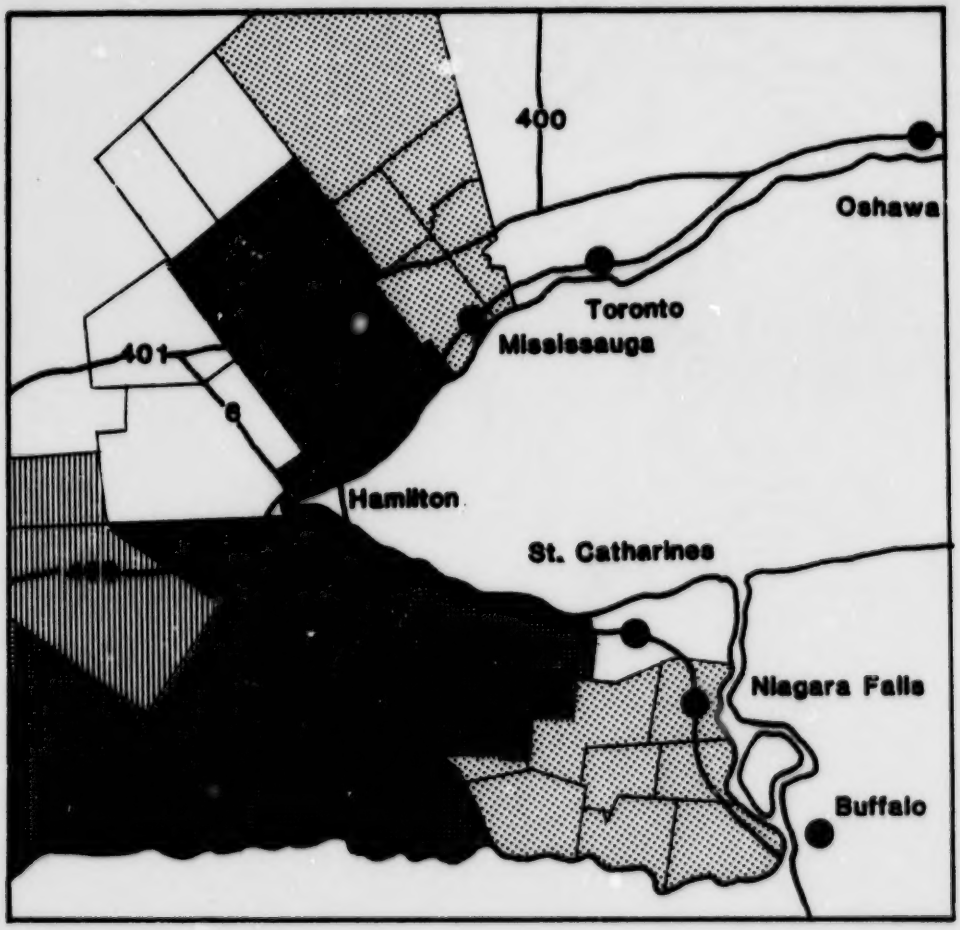
- recently published soil survey maps (Halton and Wentworth Counties, 1:63 360 scale);
- unpublished soils maps (1:25 000 and 1:50 000 scale) from recent soil survey programs of the Ontario Institute of Pedology (OIP)--Brant County, Niagara (part) and Haldimand-Norfolk Regions.

In that portion of Niagara Region formerly known as Welland County, the OIP remapping program is still in progress. Therefore, existing CLI mapping was the best source of information available.

The data sources are depicted on Figure 2-1 and summarized in Table 2-1. All updating of soil capability ratings was undertaken in consultation with the Ontario Institute of Pedology (OIP). In addition, mapping was reviewed with personnel of the Ontario Ministry of Agriculture and Food (Foodland Preservation Branch and County Agricultural Representatives) as well as members of provincial level agricultural

Figure 2-1

SOURCES OF SOIL INFORMATION FOR SOIL CAPABILITY MAPPING



SOURCE*

A Updated Soil Survey Maps - Ontario Institute of Pedology.

B Generalized Soil Survey Information - Ontario Institute of Pedology.

C Published Soil Survey Maps.

D Existing Canada Land Inventory Maps.

* Refer to Table 2-1 for details.

TABLE 2-1

DESCRIPTION OF DATA SOURCES - SOIL CAPABILITY FOR AGRICULTURE

Source	Area on Map (Figure 1)	Area Covered: Township	Area Covered: Regional Municipality/County	Compiled From	Date	Form	Scale
Ontario Institute of Pedology (OIP)	A	Town of Pelham	Niagara	Soils of the Town of Pelham, Cities of Thorold and Welland	1983	Map	1:25 000
		Town of Lincoln	Niagara	Soils of the Town of Grimsby and Lincoln	1983	Map	1:25 000
		West Lincoln	Niagara	Soils of West Lincoln Township	1982	Map	1:25 000
		City of Nanticoke	Haldimand-Norfolk	Soils of the Hagersville-Nelles Corner Area	1980	Map	1:25 000
		Town of Haldimand	Haldimand-Norfolk	Soils of the Middleport, Caledonia, Mount Hope Areas	1980	Map	1:25 000
		Town of Dunnville	Haldimand-Norfolk	Soils of the Dunnville-Perry Areas	1978	Map	1:25 000
		Town of Haldimand	Haldimand-Norfolk	Soils of the Cayuga-Canboro Area	1978	Map	1:25 000
		Town of Haldimand	Haldimand-Norfolk	Soils of the Blackheath-Caistorville Areas	1978	Map	1:25 000
		City of Nanticoke	Haldimand-Norfolk	Soils of the Waterford-Villa Nova Areas	1978	Map	1:25 000
		City of Nanticoke	Haldimand-Norfolk	Soils of the Mount Pleasant-Hartford Areas	1977	Map	1:25 000
OIP (in progress)	B	Onondaga Township	Brant County	Soil Map - Southwestern Ontario Route Stage Study	1982	Map	1:50 000
Canada Department of Agriculture and Ontario Agricultural College - University of Guelph	C	Town of Milton City of Burlington	Halton	Soils of Halton County	1970	Soil Map and Report	1:63 360
		Township of Glanbrook Town of Ancaster	Hamilton-Wentworth	Soils of Wentworth County	1965	Soil Map and Report	1:63 360
Canada Land Inventory - Soil Capability for Agriculture	D	City of Mississauga Town of Caledon, City of Brampton	Peel			Map NTS 30M/12 30M/13	1:50 000
		Town of Fort Erie, Niagara Falls, Welland and Wainfleet	Niagara			Map NTS 30M/3 NTS 30L/15 NTS 30L/14 NTS 30L/13 NTS 30M/4	1:50 000

organizations (see Appendix B for list of organizations and representatives).

The data sources and procedures for compiling soil capability for agriculture maps from the available soil survey maps are outlined below. Since the procedures differed across the study area due to the differences in the original data, procedures are described below for each major source of data.

1. The Regional Municipalities of Niagara and Haldimand-Norfolk (Map Area A). The OIP is in the process of updating soil survey maps in the Regional Municipalities of Niagara and Haldimand-Norfolk at a scale of 1:25 000. Unpublished maps were obtained for all of Haldimand-Norfolk, and the following sections of Niagara: the Towns of Grimsby, Lincoln, and Pelham, and the Township of West Lincoln.

Wherever soil conditions are relatively homogeneous, a map unit will contain one soil type and one slope class symbol. However, when the soil conditions are variable or heterogeneous, the soils information may be shown on the maps as complex units. Within a complex map unit there may be two soil types, and/or two slope conditions. The complex indicates the relative proportion of each within the map unit.

Sample Complex Soil Map Unit

$\frac{065^{5}}{a} + \frac{066^{5}}{b}$

- 50% of map unit is soil type `065´ and has a slope class `a´
- 50% of map unit is soil type `066´ and has a slope class `b´

In order to assign the CLI ratings for these complex map units, the procedure outlined below and depicted in Figure 2-2 was followed.

Procedures.

1. Updated soil survey maps and soil capability ratings were obtained from the OIP (A on Figure 2-2).

2. Maps were reduced from their original scale of 1:25 000 to the constraint mapping base map scale of 1:50 000.

3. Soil capability ratings were applied to the soil map units according to the soil type and slope characteristics. The capability ratings for soils in Haldimand-Norfolk are outlined in Table 2-2 (B on Figure 2-2). These are derived from the preliminary ratings of the OIP.

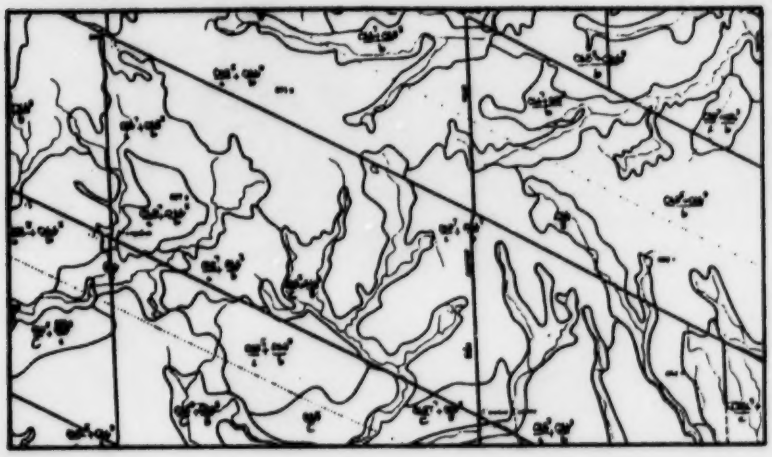
4. Soil capability ratings for soil map units in the Niagara Region were derived from "Preliminary Agricultural Soil Capabilities for Common Field Crops in the Niagara Region," Pub. No. 84-2 of the Ontario Institute of Pedology (Table 2-3).

5. Since the maps depict complex map units, a single capability rating was developed using the productivity indices developed by Hoffman (1971) and approved by the OIP for use in this study (Appendix F).

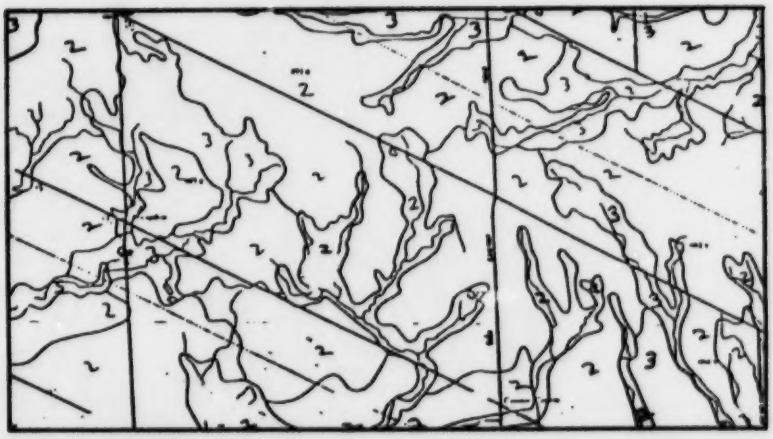
Figure 2-2

THE PROCEDURE FOR ASSIGNING SOIL CAPABILITY RATINGS IN THE REGIONAL MUNICIPALITY OF NIAGARA (PART) AND HALDIMAND-NORFOLK

A Updated Soil Map Units



B Applied Capability Ratings



C Final Soil Capability Ratings

Derived from information provided by the Ontario Institute of Pedology, 1983.

TABLE 2-2

PRELIMINARY

AGRICULTURAL SOIL CAPABILITY RATINGS

FOR HALDIMAND-NORFOLK REGION

Soil Map Unit	Soil Capabilities									
Slope Class[1]	ABb	C	c	D	d	E	e	F	f	Gg
033	1	2	2	2	3	3	4	5	5	6
043	1	2	2	2	3	3	4	5	5	6
044	1	2	2	2	3	3	4	5	5	6
045	1	2	2	2	3	3	4	5	5	6
046	2	2	2							
053	1	2	2	2	3	3	4	5	5	6
054	1	2	2	2	3	3	4	5	5	6
055	1	2	2	2	3	3	4	5	5	6
056	3	3	3							
064	2	2	2	2	3	3	4	5	5	6
065	2	2	2	2	3	3	4	5	5	6
066	3	3	3							
203	1	2	2	2	3	3	4	5	5	6
715	1	2	2	2	3	3	4	5	5	6
733	1	2	2	2	3	3	4	5	5	6
735	1	2	2	2	3	3	4	5	5	6
736	2	2	2							
806	6	6	6							
900	5	5	5							
925	3	3	3							
926	3	3	3							
935	3	3	3							
936	3	3	3							

Source: Ontario Institute of Pedology, 1983.

[1]Slope classes defined as follows:

Simple and Complex Slope	Slope %
Aa	0 - 0.5
Bb	0.5 - 2.0
Cc	2.0 - 5.0
Dd	6.0 - 9.0
Ee	10.0 - 15.0
Ff	16.0 - 30.0
Gg	31.0 - 60.0

TABLE 2-3

AGRICULTURAL SOIL CAPABILITY RATINGS FOR PARTS OF NIAGARA REGION

PRELIMINARY
C.L.I. RATINGS FOR GRIMSBY AND LINCOLN (NIAGARA REGION)

Grimsby and Lincoln Map Unit	Haldimand/Norfolk Map Unit	Haldimand/Norfolk Soil Name	Grimsby and Lincoln CLI Rating
			Slope - ABb
054	054	Brantford	1
055	055	Beverly	1
056	056	Toledo	3
064	064	Smithville	2
065	065	Haldimand	2
066	066	Lincoln	3
073 (074)	043 (044)	Ontario	1
075	043	Niagara	1
076	046	Welland	3
773 (774)	053 (054)	Brantford	1
774	054	Brantford	1
775	055	Beverly	1
776	056	Toledo	3
900	900	--	5
935	935	--	3
936	936	--	3

PRELIMINARY
C.L.I. RATINGS FOR PELHAM (NIAGARA REGION)

Pelham Map Unit	Haldimand/Norfolk Map Unit	Haldimand/Norfolk Soil Name	Pelham CLI Rating
			Slope - ABb
054	054	Brantford	1
055	055	Beverly	1
056	056	Toledo	3
064	064	Smithville	2
065	065	Haldimand	2
066	066	Lincoln	3
733	735	Teeswater	1
735	735	Teeswater	1
736	736	Maplewood	2
774	054	Brantford	1
900	900	--	5

PRELIMINARY
C.L.I. RATINGS FOR WEST LINCOLN (NIAGARA REGION)

West Lincoln Map Unit	Haldimand/Norfolk Map Unit	Haldimand/Norfolk Soil Name	West Lincoln CLI Rating
			Slope - ABb
043	043	Niagara	1
054	054	Brantford	1
055	055	Beverly	1
056	056	Toledo	3
064	064	Smithville	2
065	065	Haldimand	2
066	066	Lincoln	3
074	044	Ontario	1
075	043	Niagara	1
203 (204)	203	Brant	1
713	713	Tavistock (till phase)	1
735	735	Tavistock	1
774	054	Brantford	1
775	055	Beverly	1
776	056	Toledo	3
806	806	Brooke	6
900	900	--	5
926	926	--	3
935	935	--	3
936	936	--	3

Source: Ontario Institute of Pedology, 1983.

6. Once the capability ratings were assigned, adjacent map units with the same capability rating were grouped on the map to create a new larger map unit.

7. The ratings were then transferred to the base maps and coloured for presentation purposes.

8. The mapping was reviewed by the OIP, discrepancies along borders between adjacent map sheets were resolved and final maps prepared (C on Figure 2-2).

2. Brant County (Map Area B). Soil capability ratings for the Townships of Onondaga and Brantford were compiled as follows:

1. A list of map units in Brant County (taken from the unpublished detailed soil survey of Brant County) and capability ratings were obtained from the OIP (Table 2-4).

2. Also obtained from the OIP was a generalized soil map of Brant County which employs the following slope classes:

Slope Class	Percent Slope
Aa	0 - 0.5
Bb	0.5 - 2.0
Cc	2.0 - 5.0
Dd	5.0 - 9.0
Ee	9.0 - 15.0
Ff	15.0 - 30.0

3. To determine the capability ratings for soil map units on the generalized map, slope classes were correlated as shown in Table 2-5.

4. Capability ratings, as outlined in Table 2-4 were then applied to the generalized map.

The soil maps do not indicate the specific proportion of each soil type within a complex unit; rather they show the predominance of one versus another. Therefore, the following guidelines were developed and used in assigning capability ratings:

. Where one soil type occupies more of the map unit than another, the complex was assigned a capability rating corresponding to the predominant soil type.

. Where the two soil types are equal, a single capability was derived by combining the two soil types using the method outlined in Appendix F.

Once the capability ratings were assigned to the map units, the mapping procedure was the same as steps 6 to 8 for Niagara and Haldimand-Norfolk soil maps.

TABLE 2-4

AGRICULTURAL SOIL CAPABILITY RATINGS FOR SOILS IN BRANT COUNTY

Map Symbol	Soil Series Name	Soil Capabilities								
		Aab	b	C	c	d	D	e	E	- slope class*
On	Onondaga	2	2	3	4	5	6	6	6	
Ln	Lincoln	3								
Ha	Haldimand	2								
Ba	Brantford	1	2	3	4	5	4	6		

Source: Ontario Institute of Pedology, 1983

---

* slope class defined as follows:

Slope Class	Percent Slope
Aa	0 - 3
Bb	3 - 6
Cc	6 - 12
Dd	12 - 20
Ee	20 - 30

TABLE 2-5

CORRELATION OF SLOPE CLASSES FOR AGRICULTURAL SOIL CAPABILITY RATINGS

Slope Classes for OIP Generalized Soil Map	Percent Slope	Slope Classes for Brant County Soil Survey	Percent Slope
Aa	0 - 0.5	Aa	0 - 3
Bb	0.5 - 2		
Cc	2 - 5	Bb	3 - 6
Dd	5 - 9	Cc	6 - 12
Ee	9 - 15	Dd	12 - 20
Ff	15 - 30	Ee	20 - 30

Source: Ontario Institute of Pedology, 1983

3. The Regional Municipalities of Halton and Hamilton-Wentworth (Map Area C). In the relevant portion of the Regional Municipalities of Halton and Hamilton-Wentworth, soil capability ratings were assigned to the soil types on existing published soil survey maps (Table 2-6). The CLI ratings were taken from the reports that accompany each of the soil maps.

Procedures.

1. Portions of the soil survey maps from the Soils of Halton County, 1970 and the Soils of Wentworth County, 1965, were enlarged from the scale of 1:63 360 to the 1:50 000 base map scale.

2. Soil capabilities outlined in the reports, and confirmed by the OIP, were assigned to the soils.

3. The mapping procedure followed that employed for Haldimand-Norfolk.

TABLE 2-6

AGRICULTURAL SOIL CAPABILITY RATINGS FOR SOILS IN HALTON AND HAMILTON-WENTWORTH REGIONS

SOIL CAPABILITY WITHIN THE O.W.M.C. STUDY AREA - HALTON COUNTY -

Map Symbol	Soil Name	Texture	Assigned Rating
BaA0	Brady	Sandy loam	2
BaC1	Brady	Sandy loam	2
BeB0	Berrien	Sandy loam	2
Blc2	Brisbane	Loam	3
BL	Bottom Land		7
ChC0	Chinquacousy	Clay loam	1
ChC2	Chinquacousy	Clay loam	1
ChC1	Chinquacousy	Clay loam	1
Chc1	Chinquacousy	Clay loam	2
Chc2	Chinquacousy	Clay loam	2
FnD0	Fox	Sandy loam	2
GfB2	Gilford	Loam	4
JcB1	Jeddo	Clay loam	3
Ona1	Oneida	Clay loam	1
OnaO	Oneida	Clay loam	1
OnA0	Oneida	Clay loam	1
OnB0	Oneida	Clay loam	1
Onc1	Oneida	Clay loam	2
Onc2	Oneida	Clay loam	2
OnC2	Oneida	Clay loam	1
OnD1	Oneida	Clay loam	2
OnD2	Oneida	Clay loam	2
OnD0	Oneida	Clay loam	2
Ond1	Oneida	Clay loam	3
Ond2	Oneida	Clay loam	3
OnE2	Oneida	Clay loam	4
TucO	Tuscola	Silt loam	2

Source: J.E. Gillespie, Wicklund, R.E., Miller, M.H., Soils of Halton County. Report No. 43 of the Ontario Soil Survey.

SOIL CAPABILITY WITH THE O.W.M.C. STUDY AREA - HAMILTON-WENTWORTH -

Map Symbol	Soil Name	Texture	Assigned Rating
AlB0	Alberton	Silt loam	3
AiB0	Alberton	Silty clay loam	2
BibO	Binbrook	Silt loam	1
BicO	Binbrook	Silt loam	2
BiCO	Binbrook	Silt loam	1
BlbO	Beverly	Silt loam	1
BlcO	Beverly	Silt loam	2
BlCO	Beverly	Silt loam	1
CrcO	Brantford	Silt loam	2
BrdO	Brantford	Silt loam	3
BreO	Brantford	Silt loam	4
BtdO	Brant	Silt loam	3
BvcO	Beverly	Silty clay loam	2
CoBO	Colwood	Silt loam	2
LnaO	Lincoln	Silty clay loam	3
LnBO	Lincoln	Silty clay loam	3
LnAO	Lincoln	Silty clay loam	3
HicO	Haldimand	Silt loam	2
HlCO	Haldimand	Silty clay loam	2
HlcO	Haldimand	Silty clay loam	2
SmcO	Smithville	Silt loam	2
SmdO	Smithville	Silt loam	3
SmeO	Smithville	Silt loam	4
ToAO	Toledo	Silty clay loam	3
ToBO	Toledo	Silty clay loam	3
TiAO	Toledo	Silt loam	3
TucO	Tuscola	Silt loam	2
VicO	Vineland	Sandy loam	3
3eO	Brantford (silt loam) + Brant (silt loam)		4
3dO	Brantford (silt loam) + Brant (silt loam)		3
3fO	Brantford (silt loam) + Brant (silt loam		5
2cO	Beverly (silt loam) + Vineland (sandy loam)		2
6fO	Grimsby (sandy loam) + Ancaster (silt loam)		5

Source: E.W. Presant, Wicklund, R.E., Matthews, B.C., The Soils of Wentworth County. Report No. 32 of the Ontario Soil Survey.

4. The Regional Municipalities of Peel and Part of Niagara (Map Area D). Existing Canada Land Inventory mapping (1:50 000 scale) was the source of soil capability information for relevant portions of the Regional Municipality of Peel, the Township of Wainfleet, Town of Fort Erie, and the Cities of Welland, Thorold and Niagara Falls. Because the soil survey was in progress in this part of Niagara, the information was not available at the time of this study. The soil capability information taken from existing CLI 1:50 000 scale maps is therefore less reliable than that available for the other areas. During the site screening stage, soils information for sites within these areas was collected in the field. The procedures followed in collecting that information are discussed in Chapter 3.

Organic soils. Organic soil capability information was obtained from 1:50 000 scale maps prepared by ARDA. The maps depicting organic soil areas larger than 20 ha show only two map units within the candidate areas, one in the Town of Fort Erie, the other in Wainfleet Township. The boundaries of these units were transferred to the study area base maps and the organic soil capability ratings, as shown on the source maps, were applied to the map units.

AGRICULTURAL CROPPING SYSTEMS

A comprehensive description of existing agricultural activity across the candidate areas was required as a basis for evaluating the relative potential of OWMC's treatment and disposal facilities to impact current investments in agricultural operations. For use at the constraint mapping stage cropping system maps were prepared at a scale of 1:50 000. At this scale, agricultural land use can be mapped at approximately the farm level. Field level data will be employed at a later stage in the site selection process.

Different combinations of crop rotations, known as cropping systems, have been used as general indicators of relative levels of investment in agricultural production systems. The removal of land for a waste treatment facility in an area where high intensity cropping systems predominate would generally result in a higher level of impact on existing farm operations and on the surrounding agricultural community than in areas where cropping systems are less intensive.

Data acquisition and compilation

Cropping intensity maps were developed from Agricultural Land Use Systems maps prepared by the Land Resource Research Institute (LRRI) of Agriculture Canada and by the Ontario Ministry of Agriculture and Food (OMAF). Data for the land use systems maps were collected through field surveys and interviews with selected farm operators.

Agricultural land use systems maps provide information on the location of field crops as well as specialty crops, woodlots and non-agricultural land uses, such as idle agricultural land, built-up areas, reforestation and water bodies, and the location of agricultural buildings and service facilities.

Cropping systems are identified by grouping agricultural fields which contain typical crop rotations. Although crops may be rotated from year to year among different fields, the proportionate mix of crops within each rotation usually remains stable. Consequently the maps describe the long-term use of the land, i.e., up to five years, rather than the use in any particular year.

Definitions of the LRRI and OMAF agricultural land use systems are outlined in Appendix G. Details of the map coverage for the candidate areas are outlined in Table 2-7.

Since the data from these maps has not been widely used in site selection studies and had not been subjected to an accuracy check by independent sources, a field check of the data was carried out. Five transects across the study areas with mapping of agricultural land uses in randomly selected locations was carried out in the fall of 1983. In over 80 percent of the areas checked, the mapping matched the 1983 crop rotations observed in the field. Considering the normal shifts that occur from one year to another in crop rotations, this level of accuracy is considered quite acceptable for regional scale mapping.

TABLE 2-7

DATA SOURCES FOR AGRICULTURAL CROPPING SYSTEMS INFORMATION

Source	Area Covered		Date	Form	Scale
	Township	Municipality			
Ontario Ministry of Agriculture and Food	Town of Milton	Halton	1983	Map	1:50 000
	City of Burlington	Halton	1983	Map	1:50 000
	Onondaga	Brant	1982	Map	1:50 000
	Ancaster	Hamilton-Wentworth	1982	Map	1:50 000
	Glanbrook	Hamilton-Wentworth	1982	Map	1:50 000
	Stoney Creek	Hamilton-Wentworth	1983	Map	1:50 000
	City of Mississauga	Peel	1983	Map	1:50 000
	Brantford Township	Brant	1983	Map	1:50 000
	Town of Caledon	Peel	1983	Map	1:50 000
	City of Brampton	Peel	1983	Map	1:50 000
Agriculture Canada		Haldimand-Norfolk	1982	Manuscript	1:50 000
		Niagara	1981	Manuscript	1:25 000

Procedures for assigning cropping intensity ratings. Intensity ratings were assigned to the various mapping categories on the Agricultural Land Use Systems maps based on work by Huffman and Dumanski (1983). As a result of detailed interviews with selected farm operators in each of the agricultural land use system categories, they were able to define the relative intensity of each system using "socio-economic parameters relating to labour inputs, physical characteristics, annual income and expenses, and general capital inputs" (Huffman and Dumanski, 1983). A summary of selected socio-economic characteristics is presented in Appendix H.

In some instances, the Agriculture Canada and OMAF definitions for Field Crop Systems are not identical. To incorporate intensity ratings as described by Dumanski and Huffman (1983), cropping systems on OMAF Agricultural Land Use Systems maps were correlated with Agriculture Canada cropping systems. This involved reviewing the various system definitions as outlined in Appendix G and identifying common elements such as crop type and/or proportion within the system. Correlation of the field crop systems allowed a consistent level of intensity to be applied to the various cropping systems throughout the study area.

OMAF personnel then reviewed a proposed correlation of the two systems. Based on their comments the correlation was revised and a final scheme developed and applied as shown in Table 2-8.

The final ranking of cropping systems used in preparing the Agricultural Cropping Intensity Maps listed the systems from the highest levels of technological inputs to the lowest as follows:

Map Category		Intensity Ranking
A	Highest	- Specialty Crops[1]
1		- Row Crops or Corn-Wheat Systems
2A		- Mixed Systems
2B		- Cereal Grain or Hay-Grain or Hay (good quality)
3		- Hay (poor quality) or Grazing or Pasture
4	Lowest	- Non-Agricultural Use[2]

Specialty crops, because of their special significance, were assigned the highest intensity rating. Non-agricultural systems, because of their very low or non-existent agricultural intensity were given the lowest

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[1] Specialty crops include: field vegetables, market gardens, tobacco, nurseries, orchards, vineyards, berries and sod farms.

[2] May include urban areas, woodlots, recreational areas and scrubland.

TABLE 2-8

CORRELATION OF AGRICULTURE CANADA AND ONTARIO MINISTRY OF AGRICULTURE AND FOOD INTENSITY RATINGS FOR FIELD CROP SYSTEMS

Intensity Ranking	O.W.M.C. Cropping System Categories	Agriculture Canada Field Crop Systems	Ontario Ministry Of Agriculture and Food Field Crop Systems	Description*
High	Row Crops or Corn-Wheat	Row Crops	Continuous Row Crop	. Continuous cultivation of corn and/or beans in rotation without cereal grain or sod rotations
		Corn-Wheat	Corn	. Primarily corn and/or beans but may include cereal grains and hay rotation
Medium-High	Mixed	Mixed	Mixed	. Combination of corn or beans, grains and hay in roughly equal portions
Medium-Low	Cereal Grain, or Hay-Grain or Hay (good quality)	Cereal Grain	Grain	. Predominantly grain crops but may also include some sod crops, there are no row crops
		Hay-Grain	Hay	. Combination of good quality hay and cereal grains; some pasture may also be present
Low	Hay (poor quality) or Grazing or Pasture	Hay	Pasture	. Predominantly sod crops with minimal rotation; poor quality hay
		Grazing	Grazing	. Native grass pasture

*Refer to Appendix G for complete descriptions of the Cropping Systems.

ranking. Mixed systems were assigned a medium-high intensity rating and cereal grain, hay-grain and hay a medium-low intensity rating. Because of the presence of dairy operations in the mixed systems they have a slightly higher level of agricultural intensity than the cereal grain and hay-grain systems.

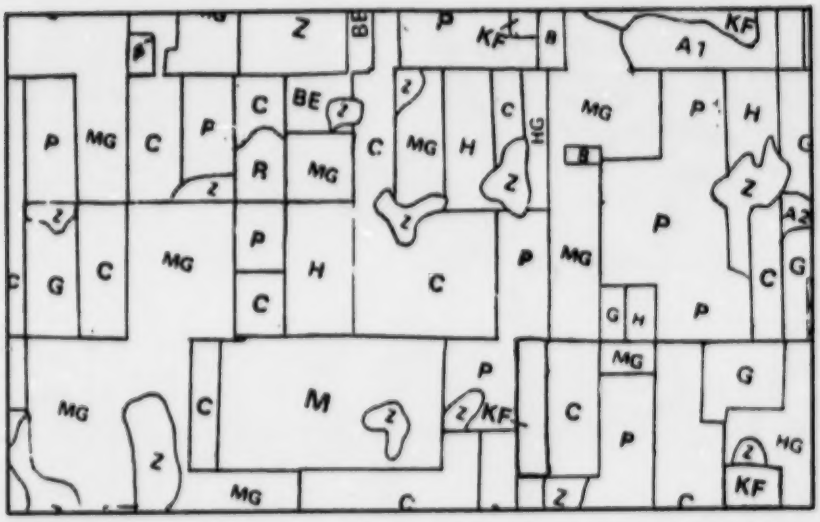
The proposed methodology for describing the agricultural cropping intensity factor was also reviewed with representatives of the OMAF Foodland Preservation Branch, and with representatives of provincial agricultural organizations. There was consensus that this approach was reasonable. Minutes of the meetings at which these items were discussed are on file with Ecologistics Limited.

Since the Agricultural Land Use Systems maps at the scales of both 1:25 000 and 1:50 000 contained too much detail for use in developing constraint maps, it was necessary to generalize the map information. The 1:25 000 scalc maps were first reduced to 1:50 000; then, map units of the same or very similar type in close proximity to one another were grouped. Each group or map unit was then assigned a crop intensity symbol. Figure 2-3 compares a typical portion of an original Agricultural Land Use Systems map with the derived Cropping Intensity Map. The final Agricultural Cropping Intensity Maps are included in the "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Technical Data Map Portfolio."

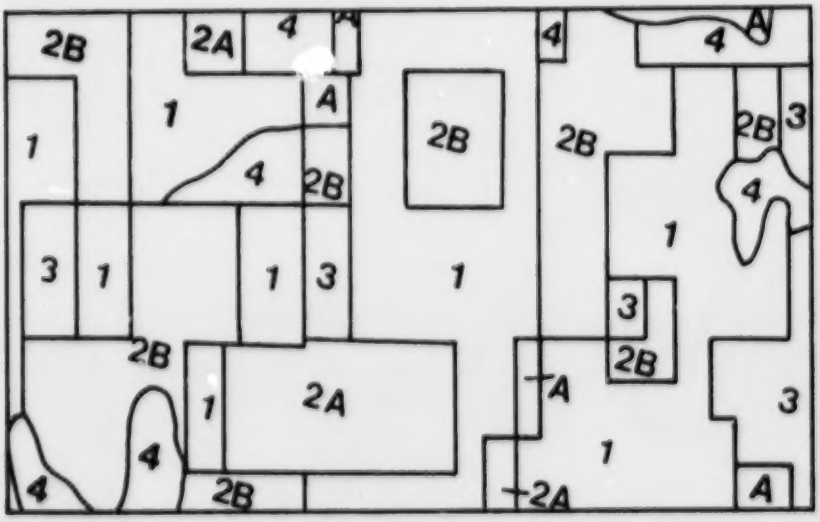
Figure 2-3

COMPARISON OF AN AGRICULTURAL LAND USE SYSTEMS MAP AND A DERIVED CROPPING INTENSITY MAP

A Agricultural Land Use Systems Map



B Derived Cropping Intensity Map



Source: Ontario Ministry of Agriculture and Food, 1983. Agricultural Land Use Systems - Town of Ancaster (Hamilton-Wentworth).

URBAN SHADOW

Parts of the rural landscape in southern Ontario have in the past and/or are at present undergoing a transition. In certain areas where agriculture once dominated land use and land ownership patterns, commercial agriculture is taking a secondary position as non-agricultural interests begin to dominate. Purchase of land by non-farmers, escalation of land prices, an influx of rural non-farm residences, hobby and horse farms, idle land and conflicts with non-farm land uses characterize many such areas.

These and other changes, commonly referred to in the literature as "urbanization" cast a shadow of doubt over the long-term viability of remaining farm operations. There is evidence to suggest that the incentive to maintain or upgrade farm buildings and land is lacking, and degradation often results. With most lands being available for farming on only a short-term lease basis, many hectares remain unused in any one year. Consequently, the output of the area is much below its potential.

From an agricultural perspective, such areas should not be excluded from consideration as candidate sites. Such views have been expressed by representatives of provincial agricultural organizations and in the public workshops. The siting of waste treatment and disposal facilities in an area presently exhibiting signs of urbanization is viewed as being additive, and not as intrusive as a siting in less urbanized rural agricultural area.

As noted earlier, the mapping of soil capability and cropping intensity failed to show the areas that are experiencing strong urbanization pressures. Parts of the candidate areas in the Mississauga-Brampton, Oakville-Milton, Niagara Falls and Welland areas are known to be experiencing or, to have experienced this phenomenon. Consequently, it was necessary to introduce at this stage a separate factor relating to urbanization.

An extensive search of the literature revealed no applicable data bases on urbanization in southern Ontario and no fully acceptable methodologies for defining and mapping relative degrees of urbanization. Consequently, it was necessary to develop an original methodology.

Research was therefore undertaken to identify indicators that would best show the relative degree to which the agricultural land base and agricultural community have been affected by urban pressures. This analysis was then applied to OWMC Candidate Areas with the result that 12 urban shadow areas (land considered under pressure to move out of agricultural production) were identified.

This section summarizes the results of that analysis; complete documentation appears in a background report entitled "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Urbanization."

Study methodology

Development of the methodology and selection of indicators were limited by data constraints, the need to use appropriate sized map units and to provide comprehensive coverage for all candidate areas. The 1981 Agricultural Census and 1981 Population Census were selected as the most comprehensive and up-to-date data sources. The most detailed data that Statistics Canada will provide is at Enumeration Area (E.A.)[1] level.

Since E.A.'s with relatively low population density can be several square kilometres in size, this raised the question of compatibility with the soil capability, cropping systems and agricultural constraint maps where the largest map units are smaller than most rural E.A.'s.

Despite these differences in level of detail of the data, use of the E.A. data was considered appropriate for the following reasons:

a) the E.A. information would be used to determine what areas, if any, should be retained for further detailed consideration and not to exclude any areas; areas could only be excluded on the basis of the more detailed agricultural constraint mapping;

b) the rationale for not using E.A. data to exclude areas is that within a large enumeration area there may be adequate space to accommodate OWMC facilities while still avoiding features which cause the enumeration area to be deemed significant.

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[1] Statistics Canada defines an enumeration area (E.A.) as a "spatial unit usually canvassed by one Census Representative." It is defined according to the following criteria: (1) Population--the number of households in an enumeration area varies between a maximum of 375 households in large urban areas to a minimum of 125 in rural areas; (2) Limits--an enumeration area, being the building block of all geostatistical areas, never cuts across any geographic area recognized by the census.

The methods used in analyzing this data were based on the review of literature on urbanization in rural and agricultural areas, and in consultation with recognized experts in the field of urbanization.

Selection of indicators. The literature review provided information on variables and methodologies used in previous research. It also brought to light the general lack of empirical research on the specific impacts of urban pressures on agricultural resources.

A list of 20 variables commonly used in the study of urbanization in rural areas was compiled from the literature. These include the following:

Agricultural variables

1 - land area farmed
2 - farm size
3 - farmland ownership/rental
4 - land use data
5 - livestock units
6 - land value
7 - capital value of farmland and buildings
8 - land fragmentation (severances/subdivision)
9 - property taxation
10 - age of farm operator
11 - part-time farming
12 - non-resident farm operators
13 - hired labour

Population and related variables

14 - population density
15 - population growth
16 - rural farm and rural non-farm population
17 - housing data—non-farm residential development
18 - number of commuters

Other variables

19 - legislation/municipal plans and by-laws
20 - conflicts and incompatibilities

Testing and evaluation of each of the above variables resulted in the selection of the following three as indicators of urban pressure on agricultural resources:

- Percentage of E.A. improved farmland that is rented;
- Percentage of E.A. that is not farmed;
- Percentage of E.A. rural population that is classified as rural non-farm.

The rationale for the selection of these three variables, and the rejection of other variables is outlined in the background report.

An analytical framework was designed, based on a combination of high, medium and low rankings of each of the three proposed indicators. It was postulated that E.A.'s with a high rental, high non-farm land use and a high rural non-farm population could be defined as urban shadow E.A.'s.

The three selected indicators and proposed method of analysis were discussed with a number of recognized experts in the field of urbanization studies. (See Appendix I for the list of experts consulted). As a result of these consultations, minor modifications were made to the selected indicators. Other variables were also suggested (population density, livestock units, age of farm operator and off-farm work) but, upon

testing, were also rejected. Although there were suggestions for other methods of analysis, there was general support for the proposed methodology.

Selection of cutoff points. No specific guidelines were presented by the experts for determining high, medium or low cut-off points for the three indicators. Consequently, the threshold values for each cut-off point were determined on the basis of the range and distribution of values recorded throughout the OWMC Candidate Areas and a comparison with provincial and candidate area averages. For the three indicators, the resulting cut-offs for high, medium and low classes are as follow:

Scaling of Indicators

Indicator	High	Medium	Low
. Percentage of E.A. improved farmland that is rented	>50%	30-50%	<30%
. Percentage of E.A. that is not farmed	>49%	25-49%	<25%
. Percentage of E.A. rural population that is classified as rural non-farm	≥85%	<85%	-

The established indicator cut-off points were applied to data for each E.A. and the groupings of high, medium and low cut-off values for the three indicators were ranked. First and second order urban shadow E.A.'s were identified according to the following combined rankings of the three indicators:

- 1st - Order Urban Shadow
  - where all three values ranked high;
- 2nd - Order Urban Shadow
  - where percentage of E.A. improved farmland that is rented ranked high;
  - where percentage of E.A. that is not farmed ranked medium; and
  - where percentage of E.A. rural population that is classified as rural non-farm.

The 9 E.A.'s that ranked as first order and the 5 E.A.'s that ranked as second order urban shadow (Table 2-9) were examined in more detail. Air photos were consulted to identify the distribution of urban development within these E.A.'s. As a result, two candidate E.A.'s were dropped. Glanbrook 101, 104 contains only a very small proportion of a candidate area and contains the Mount Hope Airport. In Haldimand 113, the rural non-farm population is clustered along Highway 6 with little in the rest of the E.A. Consequently, a total of 12 E.A.'s within the candidate areas were identified as urban shadow E.A.'s.

Further confirmation of the 12 urban shadow E.A.'s was given by: analysis of agricultural trend data at the township and county level for 1961 to 1981 from the Census of Agriculture; examination of literature concerning agriculture in the candidate areas, and a survey of the level of support accorded agriculture by municipal policies and official plans.

TABLE 2-9

URBAN SHADOW ENUMERATION AREAS

	E.A. IDENTIFICATION		INDICATOR CLASS*		
			1	2	3
(1)	1st Order Urban Shadow				
1.	Fort Erie	018	H	H	H
2.	Thorold	112,151	H	H	H
3.	Welland	001,051,052	H	H	H
4.	Mississauga	268	H	H	H
5.	Mississauga	273	H	H	H
6.	Mississauga	201	H	H	H
7.	Milton	167	H	H	H
8.	Brampton	303	H	H	H
9.	Glanbrook**	101,104	H	H	H
(2)	2nd Order Urban Shadow				
10.	Fort Erie	021	H	M	H
11.	Port Colborne	B	H	M	H
12.	Niagara Falls	003,010	H	M	H
13.	Welland	002	H	M	H
14.	Haldimand**	113	H	M	H

1. % E.A. improved farmland that is rented
2. % of E.A. that is not farmed
3. % of E.A. rural population that is classified as rural non-farm

* H = high, M = medium

** Dropped for reasons given on page 46

Results. Map E.A13, which is included in the "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Technical Data Map Portfolio," shows the distribution of urban shadow E.A.'s in the candidate areas. It is evident that the major urban shadow concentrations are found in the Region of Peel, principally in the City of Mississauga immediately south of the Town of Milton and in the southeastern section of the Niagara Peninsula within the municipalities of Thorold, Niagara Falls, Welland, Port Colborne, and Fort Erie.

Conclusions. The 12 urban shadow E.A.'s represent those areas within which urban pressures have altered the land use, land tenure, and community character enough to place the long-term viability of agriculture in doubt. The siting of a waste treatment facility in an area already subjected to urban pressures would be potentially less disruptive than it would be in agricultural areas that are relatively free of such pressures.

Consequently, these urban shadow areas are considered appropriate for consideration as potential candidate sites, regardless of the soil capability class and present agricultural use (but excluding specialty crop lands). Candidate sites within the boundaries of these E.A.'s can be examined in detail at later stages of detailed study when site specific data is available for variables such as land fragmentation, land ownership, duration of land leases, etc.

DESIGNATED INDUSTRIAL AND RESIDUAL URBAN LAND

Lands designated or proposed for industrial uses and as residual urban, as indicated in official plans, are lands which are deemed most suitable for siting OWMC facilities from an agricultural point of view. Because they have been committed to a future non-agricultural use, they have a relatively short life-span as agricultural lands and are thus more appropriate for siting purposes than lands designated as agricultural or rural.

The designations were provided by Marshall Macklin Monaghan Limited.

PUBLICLY OWNED LAND

Lands owned by public institutions for future uses which are not for agriculture are also considered potentially suitable for siting OWMC facilities from an agricultural viewpoint. Although these lands may currently be in agricultural use, the ownership status creates sufficient doubt about the future of the lands for agricultural purposes to justify retaining them as constraint-free areas for more detailed evaluation at a later stage. In this respect, they are similar to urban shadow areas.

RANKING OF AGRICULTURAL FACTORS

Since the basic objective underlying this analysis was to minimize impacts on agricultural resources, it was necessary to develop a ranking of agricultural factors which permit mapping of potentially high through to potentially low impact areas. Areas of potentially high impact were considered high constraint for locating OWMC facilities while potentially low impact areas were considered constraint-free. Appendix J contains the factor ranking sheets that were prepared during the analysis of relative constraint levels.

As noted earlier, the specific framework for this analysis consists of relative impacts to land productivity, impacts to local and regional agricultural economies and impact to agricultural communities. Initial data inputs to this analysis consisted of agricultural soil capability ratings and cropping intensity ratings. The merging of these two data sets following the procedures outlined below resulted in a preliminary map of Agricultural Constraints.

When the results of the preliminary mapping were analyzed, the problem associated with 'urban shadow' areas became apparent. Lands in the vicinity of Mississauga, Brampton, Oakville-Milton, Hamilton and Niagara Falls would be removed from further consideration due to high constraint levels arising from high soil capability ratings and active agricultural

uses. The treatment of urban shadow areas in the constraint mapping is discussed below.

It also became apparent during this stage in the process that the public and agricultural interest groups were favouring greater priority on soil capability than on impacts to existing farm structures. This order of priorities is also reflected in the OMAF Foodland Guidelines. Consequently, the initial ranking of constraints was revised to accommodate these suggestions.

The specific rationale for the relative impact levels assigned within each of the factors, the rationale for their combined rankings and the application of the urban shadow factor are outlined below. The final Agricultural Constraint Maps are included in the "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Technical Data Map Portfolio."

SOIL CAPABILITY

The CLI soil capability Classes 1 through 4 are capable of supporting the production of most field crops on a sustained basis. Classes 1 and 2 are the soils which pose the fewest limitations to crop production and therefore are grouped together. Use of these soils for a waste treatment facility would have the greatest impact on the agricultural resource base.

Classes 3 and 4 are also suitable for field crops, but the range of suitable crops is more limited than on Class 1 or 2 soils and more management input is required to achieve the full potential of these soils. Therefore, Class 3 and 4 soils are grouped as the second level capability. Siting of a waste treatment facility on these lands would still have substantial impact on the agricultural resource base, but the impact will be less than on CLI Classes 1 and 2.

Class 5 and 6 soils are capable of supporting only perennial forage crops and pasture due to severe physical limitations. Removal of these soils from production would have the lowest impact on the agricultural resource base.

The decision to group capability Classes 1 and 2, and 3 and 4 arose from the necessity to simplify the large mass of data that resulted when the soil capability and cropping intensity maps were merged. The groupings selected are consistent with the OMAF Foodland Guidelines and were endorsed by the representatives of agricultural organizations.

AGRICULTURAL CROPPING SYSTEMS

The agricultural cropping intensity classes discussed earlier have been utilized directly in the development of constraint levels. The intensity classes are indicative of the types and levels of investment in existing farm enterprises. The rationale for these cropping intensity classes is outlined on page 35.

The grouping of cropping systems, ordered from the highest level of potential impact to the lowest, are as follows:

1. Existing specialty crops.
2. Row crops or corn-wheat.
3. Mixed.
4. Cereal-grain or hay-grain or hay (good quality).
5. Pasture or grazing or hay (poor quality).
6. Non-agricultural uses.

INTEGRATION OF AGRICULTURAL FACTORS

Initial integration of the two factors, soil capability and cropping systems, yielded twelve factor groupings. To each of these, a relative impact rating was assigned: high, medium to high, medium, medium to low, and low.

In utilizing these relative impact ratings, one must consider the confidence level of the ratings. The confidence level is a function of the precision and accuracy of the data base in describing, in particular, levels of investment in existing farm operations. The rationale for the impact rating and the reasons for the confidence level assigned were recorded on the factor ranking sheets which appear in Appendix J.

The resulting impact categorization, the confidence levels assigned to these ratings and the map symbols for each set of indicators appear in Table 2-10. The final Agricultural Constraint Map was the result of

TABLE 2-10

SUMMARY OF THE AGRICULTURAL FACTOR CLASSIFICATION

Factor	Map Category	Impact	Confidence
Existing specialty crops	A	H	H
Class 1 or 2 - row crops or corn-wheat	B1	M-H	M
Class 1 or 2 - mixed	B2A	M-H	L-H
Class 1 or 2 - cereal grain, hay-grain or hay (good quality)	B2B	M-H	L-H
Class 1 or 2 - pasture, grazing or hay (poor quality)	B3	M	L-H
Class 1 or 2 - non-agricultural land use	B4	M-L	H
Class 3 or 4 - row crops or corn-wheat	C1	M-H	M
Class 3 or 4 - mixed	C2A	M	L
Class 3 or 4 - cereal grain, hay-grain or hay (good quality)	C2B	M	L-H
Class 3 or 4 - pasture, grazing or hay (poor quality)	C3	M-L	L-H
Class 3 or 4 - non-agricultural land use	C4	L	H
Class 5, 6 or 7	D	L	H

H = High
M-H = Moderate to high
M = Moderate
M-L = Moderate to low
L = Low

merging the soil capability and cropping system data with the impact rankings. The steps followed in preparing this map appear in Appendix K.

Within the rating system, soil capability was generally given greater weight than existing agricultural uses. However, when higher capability lands in very low intensity or non-agricultural uses were compared with lands in the next lower capability class that are being used intensively, the latter were given greater weight. This recognizes the potentially significant impacts to existing farm operations on, and adjacent to, a site. The impact to higher capability lands that may never be utilized is considered slightly lower.

High impact

Specialty crops are considered to be the most sensitive to the siting of a waste treatment facility due to their unique resource requirements (special soils and climate) and high income value. Lands suitable for specialty crops are identified as high priority lands for protection by the OMAF Foodland Guidelines. Also, the available evidence at present suggests that many specialty crops are sensitive to air pollutants.[1]

All specialty crop areas, regardless of land quality, are placed in the high impact category. In the absence of soil capability mapping for

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[1] See the background report on crop sensitivity, "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITE - Sensitive Crops." Ecologistics Limited, 1984.

specialty crops, it was necessary to rely on the existing specialty crop areas identified on the Cropping Intensity maps.

Moderate to high impact

1. Row crops, corn wheat, mixed, cereal-grain, hay-grain and hay (good quality) systems on Class 1 or 2 soils (Map categories B1, B2A and B2B).

These agricultural factors represent high intensive uses of the highest quality farmland, and hence the siting of a waste treatment facility on these areas would have significant impacts on the agricultural land base and local agricultural economy. The types of farm enterprises that could typically be found in such areas include cash crop, dairy, hogs, feedlots and mixed.

2. Class 3 or 4 soils used for row crops and corn-wheat systems (Map category C1).

While the intrinsic capability of this land would necessitate greater management inputs than on Class 1 and 2 soils, the use of these lands for intensive agriculture demonstrate their importance to the agricultural industry.

Moderate impact

1. Pasture, grazing or hay (poor quality) on Class 1 or 2 soils (Map category B3).

Use of these high capability soils for a waste treatment facility would result in removal of the highest capability land from production. Even though these soils are presently utilized for low intensity cropping rotations, they may have potential to be more actively used in the future; therefore, the impact to agriculture is classified as moderate.

2. Mixed, cereal-grain, hay grain or hay (good quality) on Class 3 or 4 soils (Map category C2A and C2B).

These combinations represent a mix of medium intensity uses on medium quality lands. While the production capabilities are less than on the better quality lands (i.e., Map categories B1 and B2), a loss of these areas would, nevertheless, be to the detriment of agriculture.

Moderate to low impact

1. CLI Class 1 or 2 soils with non-agricultural land use (Map category B4).

This category identifies land with the highest production capabilities which is not in use for agricultural production. Non-agricultural uses

grouped within this category include: idle land, rural residential, recreation, native forest, scrubland and swamp. Some of these uses may, however, be part of a farm property. The siting of waste treatment facilities on these lands would have less impact on the current production of food than the above categories. However, there may still be some impacts on long-term potential for food production.

2. Pasture, grazing or hay (poor quality) on Class 3 or 4 soils (Map category C3).

Although the impacts of removal of these low intensity cropping systems would be the same as to Map category B3, the overall impacts to agricultural production would be lower, as lower capability soils would be removed.

Low impact

1. Class 3 or 4 soils with non-agricultural land use (Map category C4).

Lands in this category are not in use for agricultural production but might be included within a farm property (e.g., woodlots). Use of these areas for a facility would have a relatively low impact on the present agricultural economy and on the future potential for agriculture.

2. Class 5, 6 or 7 capability soils (any land use category).

These soils are, at best, suitable for sustained production of only forage crops and pasture, the least intensive systems of agricultural activity. Accordingly, the impacts to agricultural resources would be lowest on these lands.

APPLICATION OF THE AGRICULTURAL CONSTRAINTS

As noted in the introduction to this section, the discussion of factor rankings in the public workshops suggested that a revision to the above ranking system would be appropriate. The concern was that the capability factor should generally receive more weight than the cropping system (existing uses) factor.

In response to this concern, the initial ranking of factors was revised by separating Class 3 from Class 4 lands in map categories C1, C2A and C2B in Table 2-10. This means that row crop, corn-wheat, mixed cereal grain, hay-grain and hay (good quality) cropping systems occurring on Class 3 lands are treated separately from those on Class 4 lands. Consequently, these Class 4 lands can be mapped as lower constraint areas. A decision was also made to treat any industrially designated

lands, residual urban and publicly-owned lands that were identified by Marshall Macklin Monaghan Limited as agriculturally constraint-free, irregardless of the soil capability and existing agricultural uses.

Based on the initial impact ratings in Table 2-10 and taking into account the input of the public workshops, the relative ranking of indicators was revised. The revised ranking appears in Table 2-11 where the degrees of constraint progressively increase from the bottom to the top of the table.

To account for the negative impact of urban influences on agricultural lands in the setting of constraint levels, a decision was made to treat all urban shadow areas as constraint-free from an agricultural viewpoint. These areas would, thus, potentially remain available for further evaluation based on more detailed data about the extent of urban pressures.

ACCESS ROUTE ANALYSIS

During the process of identifying site areas, a decision was made to investigate further certain areas which were constrained by agricultural factors but were considered highly desirable from a transportation and a hydrogeologic perspective. Therefore, a number of access routes were identified into an area of the Niagara Peninsula stretching from Binbrook to the Bismark-Wellandport area. More detail on these access routes is

TABLE 2-11

REVISED CONSTRAINT RANKING OF AGRICULTURAL INDICATORS

HIGH IMPACT	Existing specialty crops
	Class 1 or 2 with row crops or corn-wheat
	Class 1 or 2 with mixed, cereal grain, hay-grain or hay (good quality)
	Class 3 with row crops or corn-wheat
	Class 3 with mixed, cereal grain, hay-grain or hay (good quality)
	Class 1 or 2 with hay (poor quality), pasture or grazing
	Class 4 with row crops, corn-wheat
	Class 4 with mixed, cereal grain, hay-grain or hay (good quality)
	Class 3 or 4 with hay (poor quality), pasture or grazing
	Class 1 or 2 with non-agricultural land use
	Class 3 or 4 with non-agricultural land use
	Class 5, 6 or 7 with any use
LOW	Urban shadow, designated industrial and residual urban land, and publicly owned land with any soil capability and land use.

available in the report "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Site Selection."

For the purpose of evaluating the suitability of such access routes, factors were identified and an overview field survey of the alternate routes was carried out. From an agricultural perspective, the number of active farm complexes adjacent to the routes was selected as the evaluation factor. The number of farm complexes gives a relative indication of the probable degree of conflict between truck and farm machinery traffic.

The actively used complexes were plotted on 1:50 000 scale base maps by driving along the relevant roads and observing signs of active uses of the farm buildings.

Table 2-12 presents the routes which were examined and the approximate number of complexes observed on each. Except for option 6, the number of complexes is very similar.

CANDIDATE AREA BOUNDARY MODIFICATIONS

During the site area identification analysis, an area to the northwest of Canfield was identified as being desirable for siting from a transportation perspective. Consequently, the candidate area boundary was extended southwards, and the consultants were required to undertake an analysis of this area (refer to the report "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Site Selection").

An agricultural constraint map was prepared for this area according to the procedure described in Appendix K of this report. The map is located in Appendix L.

The agricultural factors are primarily Class 2 or 3 soils with mixed or cereal grain, hay-grain or hay (good quality) crops. From an agricultural perspective, these are high constraint factors.

TABLE 2-12

ACCESS ROAD ANALYSIS

	Route	Number of Active Farm Complexes
1.	- south on Highway 20 to Woodburn Road - south on Woodburn Road to Hamilton-Wentworth Regional Road 622 - west on Hamilton-Wentworth Regional Road 622	22
2.	- south on Highway 20 to Woodburn Road - south on Woodburn Road Road to Hamilton-Wentworth Regional Road 622 - east on Hamilton-Wentworth Road 622 to Niagara Regional Road 65 - east on Niagara Regional Road 65	23
3.	- south on Niagara Regional Road 12 to Highway 20 - east on Highway 20 to Niagara Regional Road 614 - west on Niagara Regional Road 614 to Regional Road 14 - west and south on Niagara Regional Road 14	39
4.	- south on Bartlett Avenue to Niagara Regional Road 81 - west on Niagara Regional Road 81 to Niagara Regional Road 714 - south on Niagara Regional Road 714 to Niagara Regional Road 73 - east on Niagara Regional Road 73 to Niagara Regional Road 14 - south on Niagara Regional Road 14 to Highway 20 - east on Highway 20 to Niagara Regional Road 614 - west on Niagara Regional Road 614 to Niagara Regional Road 16 - south on Niagara Regional Road 16	35
5.	- south on Niagara Regional Road 18 to Niagara Regional Road 69 - west on Niagara Regional Road 69 to Highway 20 - south on Highway 20	26
6.	- south on Niagara Regional Road 24 to Highway 20 - west on Highway 20	48

CHAPTER 3

IDENTIFICATION OF POTENTIAL SITES: SITE SCREENING

INTRODUCTION

The purpose of this second stage in the site selection process was to reduce the size and number of constraint-free areas identified during the previous stage until a relatively small number of potential sites could be identified as suitable for comparative evaluation.

This stage was carried out in two phases. In the first, the site areas that emerged from the merging of the agricultural constraints with other factor constraints were checked against the 1:50 000 scale constraint maps. A search was made for any site areas that contained high constraint map units (specialty crops, Class 1-4 land under intensive cultivation). As a result, several areas were dropped from further consideration.

In the second phase, the scale of mapping was enlarged to 1:10 000. At this level of detail, it was possible to introduce factors which address the impact perspective more specifically.

For the purpose of screening, the following five factors were applied:

- Designated industrial and residual urban land
- Publicly-owned land
- Urban shadow
- Soil capability
- Farm building complexes

Factor sheets were prepared for each of the above, which defined the factor, the rationale, sources of data and interpretation methodology (see Appendix M). Next, a rating system combining the above five factors was developed to assess the relative suitability of each candidate site area for OWMC facilities.

This chapter describes in more detail the factors, data sources, collection and analysis procedures, the factor ranking and application of the factors.

FACTORS

DESIGNATED INDUSTRIAL AND RESIDUAL URBAN LAND

Land designated or proposed for industrial uses and as residual urban, as indicated in official plans, are lands which are deemed most suitable for siting OWMC facilities from the point-of-view of agriculture. Irrespective of their soil capability and existing agricultural uses, these lands have officially been designated for conversion to non-agricultural uses.

The industrial land use designations were provided by Marshall Macklin Monaghan Ltd.

PUBLICLY-OWNED LAND

Lands owned and held by public institutions for a future use which is not agriculture are also considered potentially suitable for siting OWMC facilities from the agricultural viewpoint. Although subsequent, more detailed information may identify reasons for rejecting such lands, even in terms of agriculture, their public ownership status is sufficient reason to retain them for further consideration--despite their soil capability and current use status. The publicly-owned lands were also identified from mapping prepared by Marshall Macklin Monaghan Ltd.

URBAN SHADOW

Areas identified as `urban shadow' comprise those locations on the fringe of urban municipalities or further into the rural landscape which have in the past and/or are at present the subject of strong pressures of urbanization.

In such locations, the agricultural sector has been sufficiently disrupted as to place the long-term viability of commercial agriculture in doubt. Impacts to the agricultural land base, economy and community from the siting of an OWMC facility are lower on locations that have been, or are experiencing urban-related change than on agricultural areas which have been relatively free of such pressures.

These areas were identified during the Identification of Site Areas stage (refer to Chapter 2 and the background report, "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Urbanization").

SOIL CAPABILITY

The soil capability class indicates the relative potential of the soil resource base to produce common field crops on a sustained basis. On the higher capability classes, fewer management inputs are required. Thus, the impacts on potential agricultural production of an OWMC facility on these lands is much greater than on lower capability lands.

The soil capability information utilized was taken from the 1:50 000 scale maps produced during the previous stage. The predominant soil capability ratings for each candidate site area were estimated from the capability maps.

FARM BUILDING COMPLEXES

During the identification of site areas, agricultural cropping systems served as the factor describing relative levels of investments in agricultural operations across the study areas. At that stage of analysis it was necessary to rely exclusively on secondary sources of data.

In this second stage, identification of potential sites, it was possible to carry out a limited amount of field work. Consequently, it was possible to obtain a more direct indication of farm investment levels by field observation of the condition of farm building complexes.

The impacts of siting an OWMC facility on the long-term viability of agriculture will be greater on a site which has a greater investment in farm buildings than on a site with lower investment. The nature, size and condition of farm building complexes is indicative of the relative level of investment that would be impacted through acquisition of all, or parts of farm units. The characteristics of such facilities also give a general indication of the relative strength of agriculture within the area of the potential sites.

The relationship between farm building complexes and the use and ownership of specific parcels of land can only be determined through interviews with farm operators. Therefore, at this stage in the analysis, it was necessary to infer whether or not farm building complexes are associated with land parcels within site areas. Despite this limitation, the data are adequate when used to screen out sites which contain major building complexes of high economic value.

Also, the condition, or apparent level of investment in existing farm complexes could only be assessed from roadside inspection. It is recognized that this procedure relies on circumstantial evidence and is, thus, open to some error. However, this shortcoming is more than offset by the fact that, a) no better data base is available, b) consideration of existing use and investment in production facilities is important, and c) the use of the final data would be sensitive to these limitations. Potential sites would only be ruled out for further detailed investigation if the number of farm complexes was not on the borderline between ratings.

Details of the work undertaken to determine the ratings are outlined below.

DATA ACQUISITION AND COMPILATION

Roadside inspections of all potential site areas were undertaken to determine the characteristics of farm building complexes. Additional

support data on the farm enterprise type and the location of any specialty crops were also recorded. Data utilized for the inventory included field inventory sheets; air photographs; Ontario Base Mapping and photographs of the farm buildings. The procedure for the field inventory is outlined below.

Field inventory sheets

Field inventory sheets were developed to record the type and condition of farm building complexes. As indicated in Appendix N, each farm building complex was assigned codes describing the building type, associated structures and condition. The type and overall condition (below average, average and above average) of the farm operation that could be determined by observing the building use (i.e. livestock, or crop storage) was assessed. The rating system used in this assessment is outlined in Appendix O. The field information was then reviewed in the office by a farm appraiser to confirm the rating assigned in the field to each farm complex.

Although it was hoped that the field inspection could provide confirmation of current agricultural land use, it was not possible because of snow cover at the time when field inspections were undertaken. However, sites were field checked for specialty crops such as orchards or vineyards which could be identified under these conditions.

Aerial photographs

Aerial photographic coverage (1978) was obtained for each site area at a 1:10 000 scale. A sheet of mylar was overlaid on each photo and the site area boundaries outlined. This base was utilized during the field inspections to accurately record the location of farm building complexes and specialty crops.

Field inspections

Two field crews inventoried the site areas. All farm building complexes within the site, and those located across the road from the site were inventoried and photographed. A farm appraiser worked with both crews to achieve consistency and accuracy in the field observations. The code number for each building complex was recorded on the mylar overlay and cross-referenced with the field inventory sheet.

Data mapping

Ontario base mapping at a scale of 1:10 000 was employed as a standard base. Information recorded in the field was transferred to this base. Map E.A14 illustrates the mapped data for one of the site areas.

Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

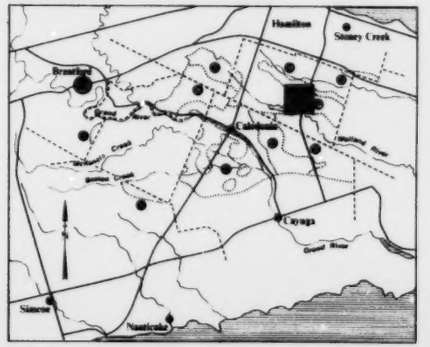
Legend:

P1B→ **Picture Number and Direction**

F — Farm Location
Farm Identification

not to scale
MAXIMUM POTENTIAL ACQUISITION BOUNDARY — 400m STUDY AREA

Key Map: **LF-4 West**
Lots 3,4,5; Concession IV (Block 4); Township of Glanbrook, formerly Township of Binbrook



1000 feet 0 1000
500 metres 0 500

Farm Building Complexes POTENTIAL SITE IDENTIFICATION

October 1984 **MAP E·A 14**

Farm building ratings

The information recorded on the field inspection sheets and the photographs of each building complex were interpreted to develop the following codes:

- Commercial farm buildings in above-average condition - A
- Commercial farm buildings in average condition - B
- Below average farm buildings (includes buildings which appear to be unused, and/or those in poor condition) - C
- Hobby and horse farms - D

In order to identify the impacts to the long-term viability of agricultural production, commercial farm building complexes were separated from hobby and horse farms. Categories A and B represent the strength of agricultural activity, and were utilized in the analysis.

RATING OF FACTORS

A rating system was developed to combine the five factors: designated land use, publicly-owned lands, urban shadow areas, soil capability and farm building complexes, and to assess the relative suitability of each candidate site for OWMC facilities from an agricultural perspective.

Site areas were rated as very good, good, fair or poor for siting OWMC facilities according to the criteria outlined below and summarized in

Table 3-1. Those which received a very good, good or fair rating are considered most suitable for further consideration during the subsequent detailed evaluation (Chapter 4).

The assumptions adopted in the development of Table 3-1, were that soil capability was more important than farm building complexes, but that an industrial or urban residual land use designation, publicly-owned land or an urban shadow designation would override either of the other two factors. Publicly-owned land which is suitable for siting includes surplus lands and lands being held for future uses and are presently idle or leased for agriculture.

Any lands which are designated industrial or urban residual or publicly owned and land situated within an urban shadow area are considered very good and good, respectively, for siting OWMC facilities; regardless of the soil capability and farm building complexes. The same applies even if the designation is not yet finalized in the official plan. These lands are considered suitable for further consideration at the next stage of study; all others were rated as follows:

- CLI Class 1 lands, irrespective of the existing farm building complexes are rated as poor for siting.

- CLI Class 2 lands with no farm building complexes, or with all existing complexes rated as below average condition, hobby or horse

TABLE 3-1

AGRICULTURE

THE AGRICULTURAL RATING SYSTEM FOR SCREENING OF AREAS AND SITE IDENTIFICATION

	Predominant Soil Capability Class				
	1	2	3	4	5,6 or 7
Designated industrial, urban residual or publicly owned	*VG	VG	VG	VG	VG
Urban shadow	G	G	G	G	G
No farm buildings	P	F	G	G	G
All farm building complexes are in below average condition, hobby, or horse farms	P	F	F	G	G
The minority of farm building complexes are in average or above average condition	P	P	F	F	G
The majority of farm building complexes are in average or above average condition	P	P	P	F	G

---

*VG - very good for siting OWMC facilities
G - good for siting OWMC facilities
F - fair for siting OWMC facilities
P - poor for siting OWMC facilities

farms were considered fair sites. If any of the farm building complexes are in average or above-average condition, the site is rated as poor.

- Any site areas with predominantly Class 3 soils are considered good if there are no existing farm building complexes. If the majority of the complexes are rated as average, or above-average condition, the site is rated poor; otherwise the site is considered fair.

- Where a site area is comprised of predominantly Class 4 soils, it is considered good if there are no building complexes, or all the complexes are in below average condition, hobby or horse farms.

- If there are any average or above average farm complexes, the site is considered fair.

- Any site area which has predominantly Class 5 or lower capability soils is considered good for siting purposes.

RESULTS OF SITE SCREENING

As a result of the first phase of site screening when the site areas were re-evaluated relative to the 1:50 000 scale constraint mapping, two site areas were dropped exclusively for agricultural reasons. Other site areas were dropped which contained agricultural as well as non-agricultural constraints.

The two site areas noted above are listed below together with the high order agricultural constraints that were found within their boundaries.

Site Areas	Constraint Map Category**
LF-1W	B1, B2A
PI-6W	C1

**Refer to Table 2-10.

After the first phase of the screening was complete, the remaining site areas were screened using the rating criteria in Table 3-1. The results of applying these criteria appear in Table 3-2. In three cases, LF-2W, PI-19E and LF-12C, the data yielded ratings that were marginally in the `poor' category. These site areas were therefore ranked as fair to enable them to remain under consideration during the subsequent Identification of Candidate Sites stage.

The site areas rated as very good, good and fair should, from an agricultural perspective, receive further consideration; the sites rated poor should have lower priority as candidate sites.

TABLE 3-2

RATING SITE AREAS

Site No.	Public and/or Designated Industrial, Urban Residual Land[1]	Urban Shadow[2]	Predominant Soil Capability Ratings	Number of Farm Building Complexes Total	Above Ave	Ave	Site Rating[3]
Landfills							
LF-1A1	I	N	1	6	0	3	VG
LF-2A1	N	Y	1	7	1	5	G
LF-1N	N	Y	1	6	0	5	G
LF-2N	I[4]	Y	1	9	0	4	VG
LF-3N	I[4]	Y	1	4	0	0	VG
LF-4N	N	N	1	12	0	7	P
LF-2W	N	N	2	8	1	3	F+
LF-3W	N	N	2	12	2	7	P
LF-4W	N	N	2	9	1	6	P
LF-5W	N	N	4	16	2	10	F

---

[1] I = Industrial land or urban residual.
P = Public land.
I/P = Industrial and public land.
N = Neither industrial or public land.

[2] Site situated wholly (Y), partly [Y(P)] or not at all (N) in urban shadow area.

[3] VG = Very good for OWMC facility siting.
G = Good for OWMC facility siting.
F = Fair for OWMC facility siting.
P = Poor for OWMC facility siting.
F+ = Changed to F due to marginal position on basis of criteria, therefore, kept in for further consideration.

[4] Proposed industrial designation.

Site No.	Public and/or Designated Industrial, Urban Residual Land	Urban Shadow	Predominant Soil Capability Ratings	Number of Farm Building Complexes Total	Above Ave	Ave	Site Rating
Landfills cont'd							
LF-7W	N	N	2	13	0	9	P
LF-10W	N	N	4	13	1	10	F
LF-11W	N	N	4	19	1	13	F
LF-13W	N	N	2	9	2	5	P
LF-14W	N	N	2	12	1	8	P
LF-1C	I^4/P	N	2	17	1	8	VG
LF-2C	N	N	3	15	1	8	P
LF-3C	N	N	2	24	3	17	P
LF-8C	N	N	3	19	7	11	P
LF-9C	N	N	3	20	5	12	P
LF-12C	N	N	2	14	0	6	F^+
LF-13C	N	N	3	11	4	3	F
LF-15C	N	N	4	36	5	23	F
LF-18C	N	N	2	13	1	10	P
LF-24C	N	N	2	13	3	8	P
LF-25C	N	N	3	10	0	9	P
LF-29C	N	N	2	10	3	6	P
LF-30C	N	N	2	10	1	7	P
LF-1E	N	Y(P)	3	13	0	7	G
LF-2E	P	N	3	4	0	0	VG
LF-3E	N	Y	3	9	0	6	VG
LF-4E	N	N	3	8	1	2	F

Site No.	Public and/or Designated Industrial, Urban Residual Land	Urban Shadow	Predominant Soil Capability Ratings	Number of Farm Building Complexes Total	Above Ave	Ave	Site Rating
Landfills cont'd							
LF-6E	I/P	Y	3	8	0	5	VG
LF-7E	I/P	Y	3	0	0	0	VG
LF-8E	I/P	Y	2	3	0	2	VG
LF-9E	N	Y	3	9	2	6	G
LF-10E	N	Y	3	12	0	6	G
LF-12E	N	Y(P)	3	6	1	5	G
Phys/Chem-Incinerator (only)							
PI-1A1	I	N	1	6	0	3	VG
PI-2A1	I	N	1	3	0	1	VG
PI-3A1	N	Y	1	7	1	5	G
PI-1N	N	Y	1	6	0	3	G
PI-2N	N	Y	1	8	0	3	G
PI-3N	N	Y	1	9	0	7	G
PI-4N	I[4]	Y	1	12	0	6	VG
PI-5N	I	Y	1	4	0	0	VG
PI-6N	I[4]	Y	1	4	0	0	VG
PI-10N	N	N	1	9	0	6	P
PI-11N	N	N	1	7	0	6	P
PI-12N	N	N	1	12	0	5	P
PI-13N	P	N	1	9	1	8	VG
PI-14N	P	N	1	9	0	5	VG

Site No.	Public and/or Designated Industrial, Urban Residual Land	Urban Shadow	Predominant Soil Capability Ratings	Number of Farm Building Complexes Total	Above Ave	Ave	Site Rating
Phys/Chem-Incinerator (only) cont'd							
PI-15N	N	N	1	11	0	8	P
PI-2W	I/P	N	4	8	2	4	VG
PI-1C	I/P	N	2	3	0	1	VG
PI-2C	N	N	3	11	3	1	F
PI-11C	N	N	2	13	2	9	P
PI-15C	N	N	3	14	2	11	P
PI-19C	N	N	2	11	0	10	P
PI-21C	N	N	2	13	3	8	P
PI-22C	N	N	2	18	4	12	P
PI-25C	N	N	2	13	1	10	P
PI-26C	N	N	2	14	2	10	P
PI-1E	I/P	Y	3	0	0	0	VG
PI-2E	I	Y	3	0	0	0	VG
PI-3E	I	Y	3	0	0	0	VG
PI-4E	I	Y	3	1	0	1	VG
PI-5E	I[4]	Y	3	7	2	4	VG
PI-6E	N	Y	3	9	0	6	G
PI-7E	N	Y	3	8	0	2	G
PI-8E	N	Y	3	8	0	2	G
PI-9E	N	N	3	10	0	4	F
PI-10E	N	Y(P)	3	12	1	4	G

Site No.	Public and/or Designated Industrial, Urban Residual Land	Urban Shadow	Predominant Soil Capability Ratings	Number of Farm Building Complexes Total	Above Ave	Ave	Site Rating
Phys/Chem-Incinerator (only) cont'd							
PI-11E	I	Y	3	7	0	3	VG
PI-12E	N	Y	3	3	0	2	G
PI-13E	N	Y	3	3	0	1	G
PI-14E	N	Y	3	10	1	6	G
PI-15E	N	Y	3	2	0	2	G
PI-16E	N	Y	3	6	0	2	G
PI-17E	N	Y	3	8	0	5	G
PI-18E	I	Y	3	4	0	3	VG
PI-19E	N	N	2	2	0	1	F+
PI-20E	I	Y	3	7	0	5	VG
PI-21E	I/P	N	3	4	0	0	VG
PI-26E	N	Y(P)	3	18	0	8	G
PI-27E	I[4]	Y	2	4	1	2	VG
PI-30E	N	Y	3	14	0	4	G
PI-31E	N	Y	3	14	1	6	G
PI-34E	I/P	Y	3	3	0	2	VG
PI-37E	N	Y(P)	3	7	1	5	G

CHAPTER 4

COMPARISON OF POTENTIAL SITES AND THE IDENTIFICATION OF CANDIDATE SITES: INITIAL COMPARATIVE EVALUATION

INTRODUCTION

The purpose of this stage was to explore the relative differences among the siting options in order to further reduce the number of potential sites under consideration. The OWMC siting objectives of this stage, from the point-of-view of the agricultural factor, were:

1. to develop more specific factors for the relative impact of OWMC facilities on the agricultural resource base of potential sites and their surrounding areas;

2. to develop a rating system which will distinguish between, and permit a comparison of the agricultural impacts at the site and site vicinity levels and along access roads.

At this stage in the study, it was possible to add new factors to the analysis while continuing to work at a base map scale of 1:10 000. As in the previous stages the data used came from secondary sources and roadside observations.

Consistent with the general analysis procedures used by all of the consultants during this stage, factors were selected which relate to the site, to the site vicinity and to local and regional access roads (Table 4-1). The site refers to the lands within the proposed acquisition area. The site vicinity includes only land parcels that are 1000 m or closer to a potential incinerator or within 500 m of the boundary of a landfill.

FACTORS

SITE FACTORS

Existing resources

1. Cultivated land - This factor indicates the relative proportion of land within a site which is under cultivation. Agricultural impacts are greater on sites with a high proportion of land in use for agricultural production than on sites with more idle or non-agricultural land uses.

2. Farm building complexes - As discussed in Chapter 3, this factor refers to the complex of farm buildings, i.e. barns, storage sheds, silos, grain bins, manure storage, etc. Impacts will generally be greater for sites with relatively higher investment in farm buildings.

TABLE 4-1

AGRICULTURAL FACTORS FOR INITIAL COMPARATIVE EVALUATION

	Site Factors	Vicinity Factors
Existing Resources -	Cultivated land	Farm building complexes
	Farm building complexes	Sensitive crops
	Land fragmentation (Urban shadow)	Livestock densities
Future Resources -	Soil capability	Soil capability
	Designated land use	Designated land use
	Publicly-owned land	

	Access Roads
Local Roads -	Number of active farm complexes
	Livestock populations
	Soil capability
Regional Roads -	Number of active farm complexes
	Sensitive crops
	Livestock populations

As in the previous stage, the nature, size and the condition of the farm building complexes were used to indicate the level of farm infrastructure investment. The number and rating (average and above average) of farm building complexes on holdings occupied in whole, or part, by the site were obtained.

At this stage, it was possible only to infer which of the farm complexes are on lands partially or entirely occupied by the site. During the next stage, it will be possible to gather information on the relationship between farm infrastructure investment and land ownership through interviews with the landowners.

Initially, it was assumed that the presence of tile drainage systems would be a significant consideration in the comparison of infrastructure investment among sites. Consequently, tile drainage data was summarized for each site from maps prepared by OMAF. However, the amount of tile drainage was generally very limited, never exceeding 32 percent of site lands and, thus, was not used as a comparative factor.

3. Land Fragmentation - This factor measures the number of land holdings within the potential site acquisition area which are less than 20 ha in size plus the number of residences. It serves as an indicator of the degree of fragmentation of land parcels into small ownerships and is a more site specific indication of the urban shadow influence. The proliferation of small land holdings increases the difficulty of maintaining land in long-term use for commercial agriculture. The number

of residences indicates the degree to which agricultural use of adjacent lands may be constrained by conflicts with non-farm residents.

The potential effects on the agricultural resource base of a facility siting will be higher in an area where agriculture is the predominant use. In areas with extensive non-agricultural intrusions, the potential impacts on agriculture would generally be less.

Future resources

1. Soil capability - The number of hectares of "Class 1 equivalent" land within the acquisition zones was determined. The "Class 1 equivalent" hectares were then expressed a percentage of the total site area so that sites made up of several different capability classes could be compared. The smaller the percentage of Class 1 equivalents, the lower the potential for agricultural production. Therefore, the impact of a facility siting on agricultural land resources would be least on a site with the smallest percentage of Class 1 equivalents.

2. Designated land use - Official Plan designations for the site lands are indicative of a community's intentions in the short to medium-term future for appropriate land uses. For the sites in question, the designations are either agriculture, rural agriculture, good general agriculture, rural agriculture 1 and 2, rural, heavy industrial, industrial, special policy area (S.P.A.). Only lands falling within one

of the first five designations have a long-term opportunity to realize the potential of the land resource base for agriculture.

3. Public land ownership - Public authorities have acquired lands for various purposes. In some cases these lands are still in an agricultural use under leasing arrangements. Where a non-agricultural use has not yet preempted agriculture on public lands within a potential site, the public land ownership was considered as a factor.

VICINITY FACTORS

Existing resources

1. Farm building complexes - The rationale for this indicator is the same as that outlined above for existing resources of sites. Holdings in the vicinity include any farm unit with land within a 1000 m radius of the emissions area and/or 500 m from the borders of a landfill site.

2. Sensitive crops - In keeping with the site selection objectives of minimizing risk to human health (via the food chain) and minimizing impact to the environment (agricultural resources), it is necessary to take into account, as a siting factor, the risks associated with exposure of agricultural crops to potentially harmful levels of airborne contaminants. These could come from an incinerator stack and/or be fugitive emissions from a physical/chemical treatment facility.

It is therefore necessary to identify those agricultural crops which are potentially the most sensitive to such emissions. There are basically two categories of such crops: a) those that could introduce contaminants into the food chain through human and/or livestock consumption of the exposed crops, and b) those that could cause economic loss to a farm operator through yield reductions and/or consumer reluctance to purchase produce that was exposed.

There is little precedent for use of such a factor in site selection processes. The only application discovered during the literature review was a study by Ontario Hydro (1979). That study considered crop sensitivities to sulphur dioxide and ozone in site selection for new electrical generation facilities. A crop sensitivity index was developed by Ontario Hydro and applied to census data from the 1976 Agricultural Census for all enumeration areas in southern Ontario.

Because of the complex procedures used in the Ontario Hydro work, an attempt was made at developing a simpler methodology. The approach developed is described in a background report[1] and is summarized below.

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[1]"SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Sensitive Crops," Ecologistics Limited, 1984.

The methodology for developing a crop sensitivity factor required several sets of information: a) agricultural crops in the study areas, b) assumptions about the types of possible contaminants, c) sensitivities of crops grown in the study area to the possible contaminants, and d) the relative presence and value of "sensitive" crops in the study area.

In terms of the range of agricultural crops normally grown in the study areas, the list in Table 4-2 was developed from annual production statistics of OMAF.

For the assumptions about possible emissions results of preliminary work by the Ontario Research Foundation was utilized in identifying the range of contaminant types that might be emitted. This work and the further literature review summarized in the background report were used in developing a preliminary listing of sensitive agricultural crops.

For each major category of crop degrees of sensitivity relative to a) accumulation of toxicants in edible tissues, and b) visible injury to the crop were determined. Table 4-2 summarizes the relative sensitivity of crops grown in the study area to accumulation of toxicants in edible tissue. The relative sensitivity of these crops to injury to toxicant emissions is summarized in Table 4-3.

TABLE 4-2

RELATIVE ACCUMULATION OF CONTAMINANTS IN EDIBLE CROP TISSUE

Field Crops		Specialty Crops	
Forages		**Leafy Crops**	
Alfalfa	High	Asparagus	High
Clover	High	Caggage, Cauliflower Broccoli	High
Corn	High	Lettuce	High
Grass	High		
Grains		**Root Crops**	
Barley	Low	Beet	Intermediate
Buckwheat	Low	Carrot	Intermediate
Corn	Low	Onion	Intermediate
Oat	Low	Potato	Intermediate
Rye	Low		
Wheat	Low		
Other Seeds		**Vegetable Fruits**	
Bean	Low	Snap Bean	Intermediate
Soybean	Low	Sweet Corn	Low
Sunflower	Low	Cucumber	Intermediate
		Pea	Low
		Tomato	Intermediate
		Fruit	
		Apple	Intermediate
		Apricot	Intermediate
		Cherry	Intermediate
		Grape	Intermediate
		Peach	Intermediate
		Pear	Intermediate
		Plum, Prune	Intermediate
		Strawberry	Intermediate

Source: "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Sensitive Crops," Ecologistics Limited. 1984.

TABLE 4-3

RELATIVE SENSITIVITY OF CROPS TO INJURY BY CONTAMINANTS

Field Crops		Specialty Crops	
Forages		**Leafy Crops**	
Alfalfa	High	Asparagus	Low
Clover	High	Cabbage, Cauliflower Broccoli	Intermediate
Corn	Intermediate	Lettuce	High
Grass	Intermediate		
Grains		**Root Crops**	
Barley	Intermediate	Beet	Intermediate
Buckwheat	Intermediate	Carrot	Intermediate
Corn	Intermediate	Onion	Intermediate
Oat	Intermediate	Potato	Intermediate
Rye	Intermediate		
Wheat	Intermediate		
Other Seeds		**Vegetable Fruits**	
Bean	High	Snap Bean	High
Soybean	High	Sweet Corn	Intermediate
Sunflower	Intermediate	Cucumber	Intermediate
		Pea	Intermediate
		Tomato	Intermediate
		Fruit	
		Apple	Intermediate
		Apricot	Intermediate
		Cherry	Intermediate
		Grape	Intermediate
		Peach	Intermediate
		Pear	Intermediate
		Plum, Prune	Intermediate
		Strawberry	Intermediate

Source: "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Sensitive Crops," Ecologistics Limited. 1984.

A composite list was developed for sensitive crops taking both aspects of sensitivity into account. All crops which were identified as having "high" sensitivity on Table 4-2 or being "sensitive" on Table 4-3 were included on the list. Also included were two less sensitive vegetable fruits, cucumber and tomatoes and all of the fruits. The latter were included because they are crops for which the edible portion is directly exposed to the atmosphere and which may be consumed in whole by humans. None of these crops has a protective husk or shell. The resulting list therefore represents potential risks both to human health and the economic viability of producers of such crops.

For the purpose of documenting the extent of sensitive crops under cultivation in the study area, it was necessary to utilize statistics from the 1981 Census of Agriculture. In turn, this required a correlation of terminology for some of the crop categories that differ between the Census of Agriculture and the OMAF production statistics. Table 4-4 lists 23 sensitive crop categories as defined in the Census and shows the correlated OMAF terms used in Tables 4-2 and 4-3.

Application of the data on sensitive crops was made within a 5 km radius of each incinerator site. This preliminary "zone of influence" was established by the OWMC emissions consultants, Ontario Research Foundation,[1] for use in the evaluation of potential sites.

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[1]"SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Atmospheric Conditions." Ontario Research Foundation, 1984.

TABLE 4-4

SENSITIVE AGRICULTURAL CROPS IN OWMC CANDIDATE AREAS

BASED ON THE CENSUS OF AGRICULTURE CROP CLASSIFICATION

FIELD CROPS

Forages

- Corn for ensilage* (Forage corn)**
- Oats for fodder (Oats)
- Other fodder crops (Various)
- Tame hay (Alfalfa, clover and grass)
- Improved pasture (Alfalfa, clover grass)

Other Seeds

- Bean
- Soybean

SPECIALTY CROPS

Leafy Crops

- Asparagus
- Cabbage
- Cauliflower
- Broccoli
- Lettuce

Vegetable Fruits

- Snap bean
- Cucumber
- Tomato

Fruits

- Apple
- Apricot
- Cherry
- Grape
- Peach
- Pear
- Plum and prune
- Strawberry

---

*Crop classification terms utilized in the Census of Agriculture, 1981.

**Terms utilized in the Agricultural Statistics for Ontario, Publication 20, OMAF, 1981 which appear in Tables 4-2, 4-3 and differ from the Census of Agriculture terms.

3. Livestock densities - Less is known about the sensitivity of livestock and poultry to air pollutants than about the sensitivity of crops. This is mainly a function of the relative amount of research effort to-date. However, concerns have been expressed at several OWMC workshops and by agricultural groups about the safety of livestock and poultry in the vicinity of an incinerator.

In keeping with the objective to minimize risks to human health via the food chain and impact to agricultural resources, it was considered appropriate to include a livestock factor in the analysis of potential impacts. The factor chosen was livestock density. This includes all dairy and beef cattle, hogs, chickens and turkeys per 40 ha of farmland.

The tendency in selecting sites should, therefore, be toward picking incinerator sites with the lowest livestock densities in the vicinity of the site.

Future resources

1. Soil capability - The predominant soil capability classes within a 1 km radius of the site were identified from the soil capability mapping. This indicates the general potential for agriculture in the site area from a land resource point-of-view.

2. Land use designation - This indicator was treated the same as that for the sites, but applies only to lands within the 1000 m radius of the emissions area.

ACCESS ROAD FACTORS

Local roads

1. Active farm complexes - The number of active farm complexes situated along access roads indicates the degree of potential conflict between truck movements and movement of farm machinery. The tendency should be to choose sites with access roads that have the fewest number of active farm complexes.

2. Livestock populations - An estimate was made of the population of livestock and poultry within a 2 km wide band centered on the local access road. This provides a measure of the relative risk to livestock and poultry and the food chain due to accidental spills of untreated toxic materials in transit. Vapour or liquid movement, from the spill site could affect the health and/or economic value of livestock that come into contact with the toxic substances.

3. Soil capability - The length in kilometres of Class 1 equivalent land traversed by local access roads indicates the degree to which land resources potential may be lost if local roads must be widened to achieve acceptable standards for the truck traffic.

Regional roads

1. Active farm complexes - This factor was treated the same as the factor for the local roads.

2. Sensitive crops - The estimated total value of sensitive crops within a 2 km band centered on the access road was determined from the 1981 Agricultural Census. It measures the relative risk to sensitive crops in the event of a spill of untreated toxic wastes being transported to the treatment facilities.

3. Livestock populations - This factor was treated the same as the livestock population factor for local roads.

DATA COLLECTION

SITE ACQUISITION AREAS

Site size

The size of each potential site was measured on 1:10 000 scale air photos (1978). Where air photos are not available, 1:10 000 NTS base maps were used.

Cultivated land

The location of cultivated lands within each potential site was obtained from the Agricultural Land Use Systems maps of OMAF and Agriculture

Canada. Cultivated lands consisting of row crops, corn-wheat, mixed cereal grain, hay-grain and hay systems were plotted on the 10 000 scale base maps. The cultivated lands were distinguished from idle lands (as shown on the agricultural land use systems maps) and from treed areas and non-agricultural land uses delineated by OWMC's biological and land use consultants. A dot grid overlay was used to measure the area of cultivated land.

Farm building complexes

The number of average and above average farm building complexes situated within the potential site acquisition boundaries, or on land holdings that are, in part, within the potential site were totalled.

The farm complex information was taken from the field inspections in the Site Screening stage. The boundaries of land parcels were derived from assessment role data obtained at the District Offices of the Ontario Ministry of Revenue, Assessment Branch.

Urban shadow

The number of holdings less than 20 ha within the site was determined from the assessment role data. The number of rural non-farm residences was estimated by subtracting the number of farm building complexes from the total number of residences that were identified by Marshall Macklin Monaghan Ltd.

Soil capability

In order to estimate the CLI Class 1 equivalents, the area of each soil capability class within a potential site was measured on the updated soil capability maps prepared for the identification of site areas stage.

The procedure for calculating Class 1 equivalents is based on Step 1 and 2 of Appendix F where a capability index is determined for each capability map unit. These values were then multiplied by the area of the map unit and summed. The sum represents the Class 1 equivalent rating for the site.

An exception to the above as the data source for this analysis occurred in former Welland County area of the Region of Niagara. In this case, the existing soil survey and soil capablity information was very outdated and very generalized. Therefore, for the non-industrially designated sites (LF-1E, IC and 3E) the soils information was upgraded through shallow soil borings along road allowances.

Soils along the road allowances in the area of these sites were inspected and correlated with the soil types identified in Niagara Region by the OIP. Based on a sampling technique, the percentage area of each site occupied by various soil capability classes was determined.

Predominant land use designation

The land use designation was obtained from local and regional official plans and provided by Marshall Macklin Monaghan Ltd.

Publicly-owned land

Public land holdings within candidate sites were identified by Marshall Macklin Monaghan Ltd.

SITE VICINITY

Farm building complexes

The condition of farm building complexes was obtained by field inspection for farm holdings with land within 1000 m of the emissions area or 500 m of the outer limits of a landfill site. The buildings were plotted on 1:10 000 scale NTS base maps, photographed and rated according to the criteria developed for the Site Screening stage.

Sensitive crops

As an index for comparing sites, the average value per hectare of enumeration area (E.A.) of sensitive crops for all lands within a 5 km radius of incinerator sites was calculated. It should be noted that this value does not represent the true dollar value of crops, but can be used as a common measure to compare sites.

The procedure for determining the values are as follows:

1. The potential site was plotted on a map of the enumeration areas and a 5 km circle drawn around it (see Figure 4-1).

2. Sensitive crop areas were obtained from the 1981 Census of Agriculture on an enumeration area basis for all E.A.'s that fall within the 5 km circle.

3. A sheet was developed to calculate the crop value per hectare of E.A.

4. A five-year average dollar value per hectare was calculated for each crop from production statistics available in the Agricultural Statistics for Ontario Publication 20, OMAF, 1978-1982. The values were calculated, where possible, on a County basis (Appendix P). The value per hectare of sunflowers, apricots and dry field beans is not available. Since the reported area of these crops is very small, they were not included in the calculations.

5. In each enumeration area, the reported area of each crop was multiplied by its value per hectare. These gross values were summed, and then divided by the total hectares of the enumeration area, to obtain a value of sensitive crops per hectare of E.A.

6. A dot grid overlay was used to estimate the proportion of the 5 km circle occupied by each E.A.

7. An average value for the 5 km circle was estimated using data from Steps 5 and 6. The value per hectare for each site is included in Appendix Q and Map E.A15 in the "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Technical Data Map Portfolio."

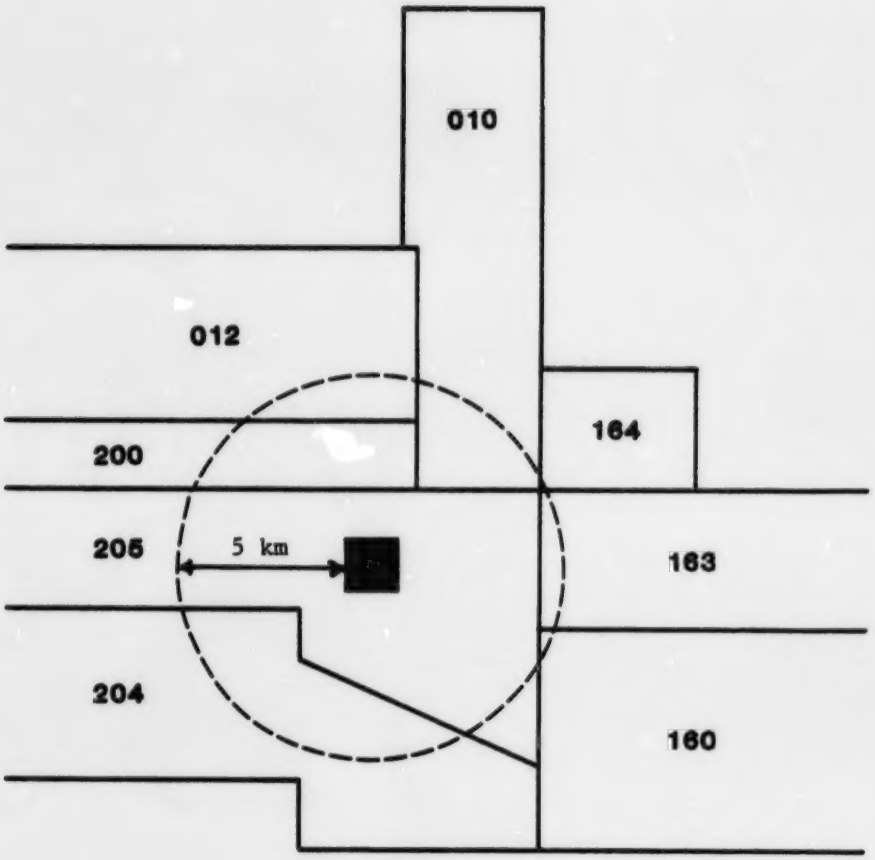
It should be noted that these average values, when expressed on a per hectare basis for all land within the 5 km radius, are substantially lower than normal values per hectare for lands in production. These lower values are simply a function of the calculation procedure but are valid for making relative comparisons among siting alternatives.

Livestock density

The procedure for estimating the livestock density in the 5 km zone around incinerator sites is similar to the sensitive crop analysis. The number of dairy and beef cattle, hogs, chickens and turkeys per 40 ha of farmland was obtained from the 1981 Census of Agriculture and summed for each E.A. Next, an average livestock density for the 5 km circles was calculated. This was done by multiplying the total number of livestock in each E.A. by the proportion of the 5 km circle that it occupies (see Map 4). The results are included in Appendix Q and Map E.A16 in the "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Technical Data Map Portfolio."

Figure 4-1

SCHEMATIC ILLUSTRATION OF THE 5 km ZONE AROUND POTENTIAL SITES



Enumeration Area Boundary

5 km zone

Candidate Site

Note: Not to scale.

Soil capability class

The predominant soil capability class within 1 km of the site was identified by a visual inspection of the Soil Capability for Agriculture maps (Map E.A1 TO E.A4).

Land use designation

As in the data collection for candidate sites, the land use designations were obtained from Marshall Macklin Monaghan Ltd. The specific designations within sites were identified whereas the predominant (in terms of aerial extent) land use designations in site vicinities were identified.

ACCESS ROADS

Length

The number of kilometres of each local access road was obtained by measuring its length on the 1:10 000 scale NTS base maps.

Active farms

The location and number of active farms adjacent to the access roads were obtained through a windshield survey.

Livestock population

An estimate of the livestock population in a 2 km band along the access roads was based on the 1981 Census of Agriculture Statistics at the E.A. level, and the following calculations.

1. A 2 km band centred on the access road was delineated on a map of the enumeration areas (Figure 4-2).

2. The access road was divided into segments according to the following rules:

   - where the road forms the boundary between 2 E.A.'s, the segment is defined by the common boundary (Figure 4-2, Segment A and B).

   - where the road traverses an E.A., a segment is defined by the length of the traverse (Figure 4-2, Segment C and D).

3. For each segment of the access road, the livestock population was estimated by the following formula:

   the livestock population = area x livestock density

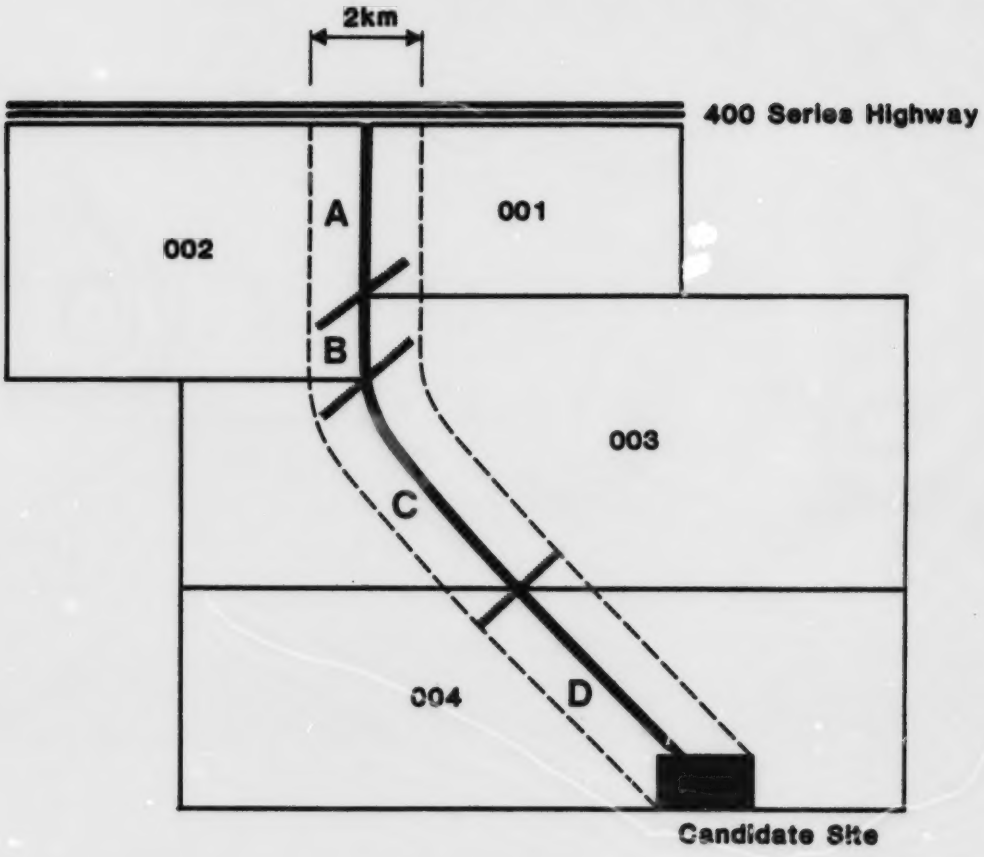
   where:

   area (hectares) = segment length (km) x width of the band (km) x 100 ha/km^2

   livestock density = the total number of cattle, dairy, hogs, poultry and turkeys per hectare. Where the access road formed the boundary between two E.A.'s. an average of the two was used.

Figure 4-2

SCHEMATIC ILLUSTRATION OF THE 2 km BAND ALONG ACCESS ROADS



Enumeration Area Boundary

2 km Wide Band

A Access Road Segment

Note: Not to scale.

4. The livestock population for each segment was totalled to obtain an estimate of the total livestock population along the full length of the access road.

Sensitive crops

A procedure similar to that used for the livestock population calculation was utilized in estimating a value for sensitive crops within the 2 km band along the regional access roads. The delineation of the 2 km band, and identification of segments was the same as Step 1 and 2 of the livestock population estimates.

For each segment of the access road, a value for sensitive crops was calculated by the following formula:

the value of sensitive crops = area x the average of sensitive crops value per hectare

where:

area (hectares) = segment length (km) x width of the band (km) x 100 ha/km^2

the average value per hectare = the gross value of sensitive crops x the total hectares in an E.A.

The gross value of sensitive crops for each E.A. was obtained by the procedure outlined on page 102 (Steps 4 and 5). The value of each road segment was summed.

Soil capability

The procedure for calculating the CLI Class 1 soil equivalents traversed by the local access roads is outlined in the following steps and accompanying figure.

FIGURE 4-3

AN EXAMPLE CALCULATION FOR DETERMINING CLASS 1 EQUIVALENTS

CLI Class 1 2 3

----------/----------/---------- Local Access Road

Length[1] (km) ------ 3 ------/------ 4 ------/------ 3 ------

		Kilometres		Index		
Class 1 Equivalent[2]	=	3	x	1.00	=	3.00
		4	x	0.80	=	3.20
		3	x	0.64	=	1.92
						8.12 km

---

[1] The length of each soil capability class was measured on 1:50 000 scale Soil Capability Maps.

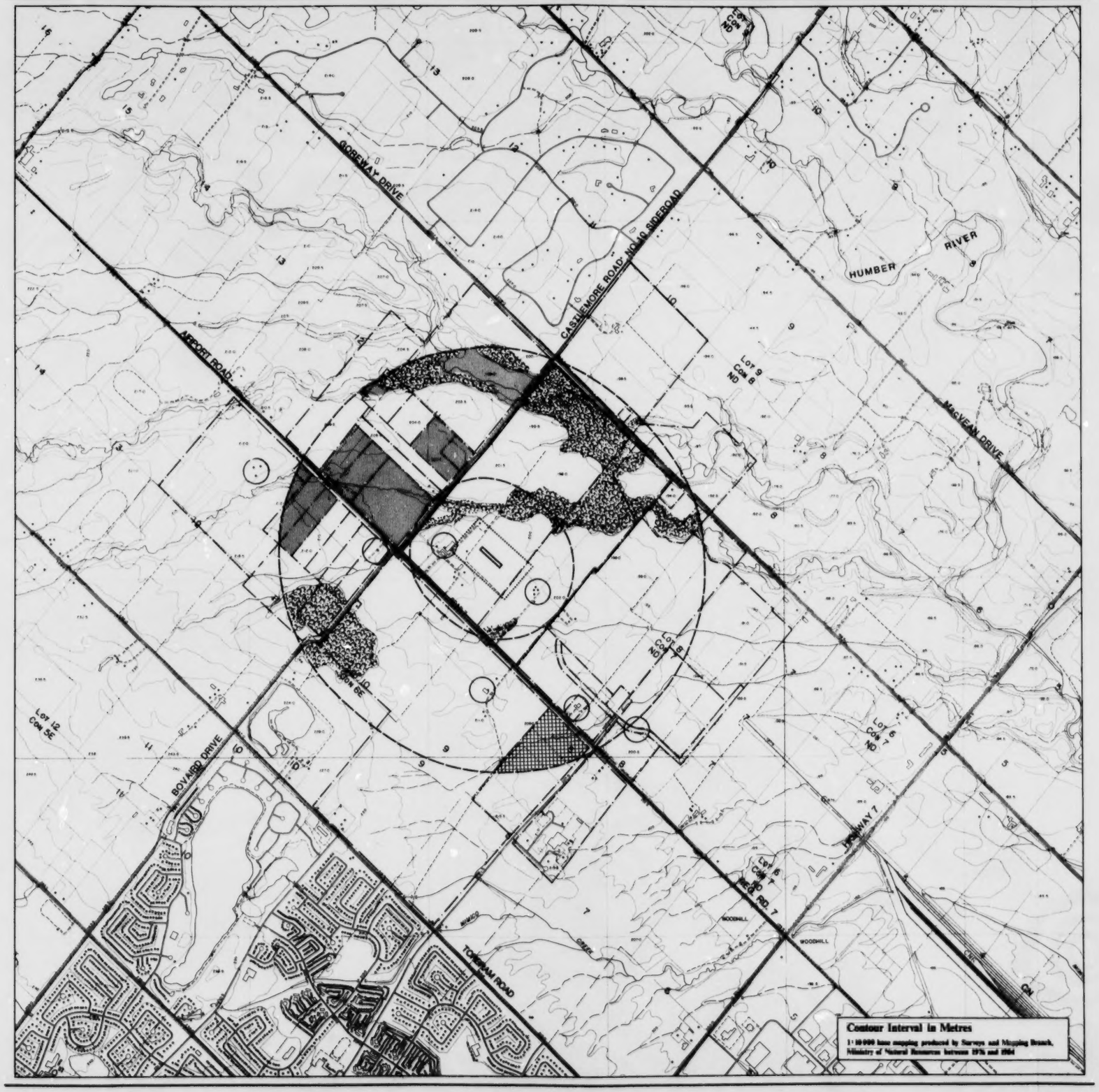
[2] For each length, the class was converted to a Class 1 equivalent, using the procedure outlined in Appendix F. The values for the segments were summed to give a total Class 1 equivalent length for each local access road.

DATA ANALYSIS AND RESULTS

The data for potential sites and site vicinities concerning cultivated land, property boundaries and farm complex ratings are shown on a series of 1:10 000 scale maps for the sites under consideration (see Maps E.A17 to E.A.34).

Table 4-5 contains a summary of the data for integrated siting options and Table 4-6 for partially integrated siting options. The data are presented first for sites and then site vicinities. For the sites the data include site size, the number of farm complexes by rating class (average and above-average), the number of land holdings under 20 ha in size plus the number of non-farm houses, the amount of Class 1 equivalent land, land use designations and public land ownership. For each site vicinity, there are data on farm complexes, sensitive crops and livestock density, predominant soil capability class and predominant land use designation.

Appendix R summarizes all of the numerical data collected for each site and site vicinity under consideration. Since it was anticipated that there would be interest in knowing the actual soil capability composition of each site the hectares of each capability class in each site area are presented in Appendix S.



OWMC Ontario Waste Management Corporation

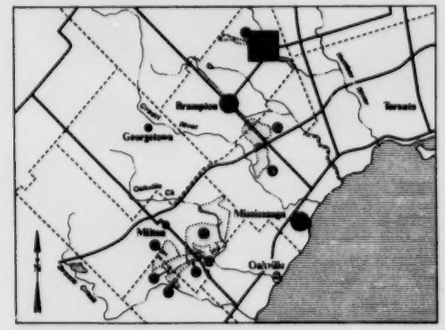
Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex

Key Map: **PI-1A1**

Lot 10 and Part of Lot 9; Concession VII; City of Brampton, formerly the Toronto Gore



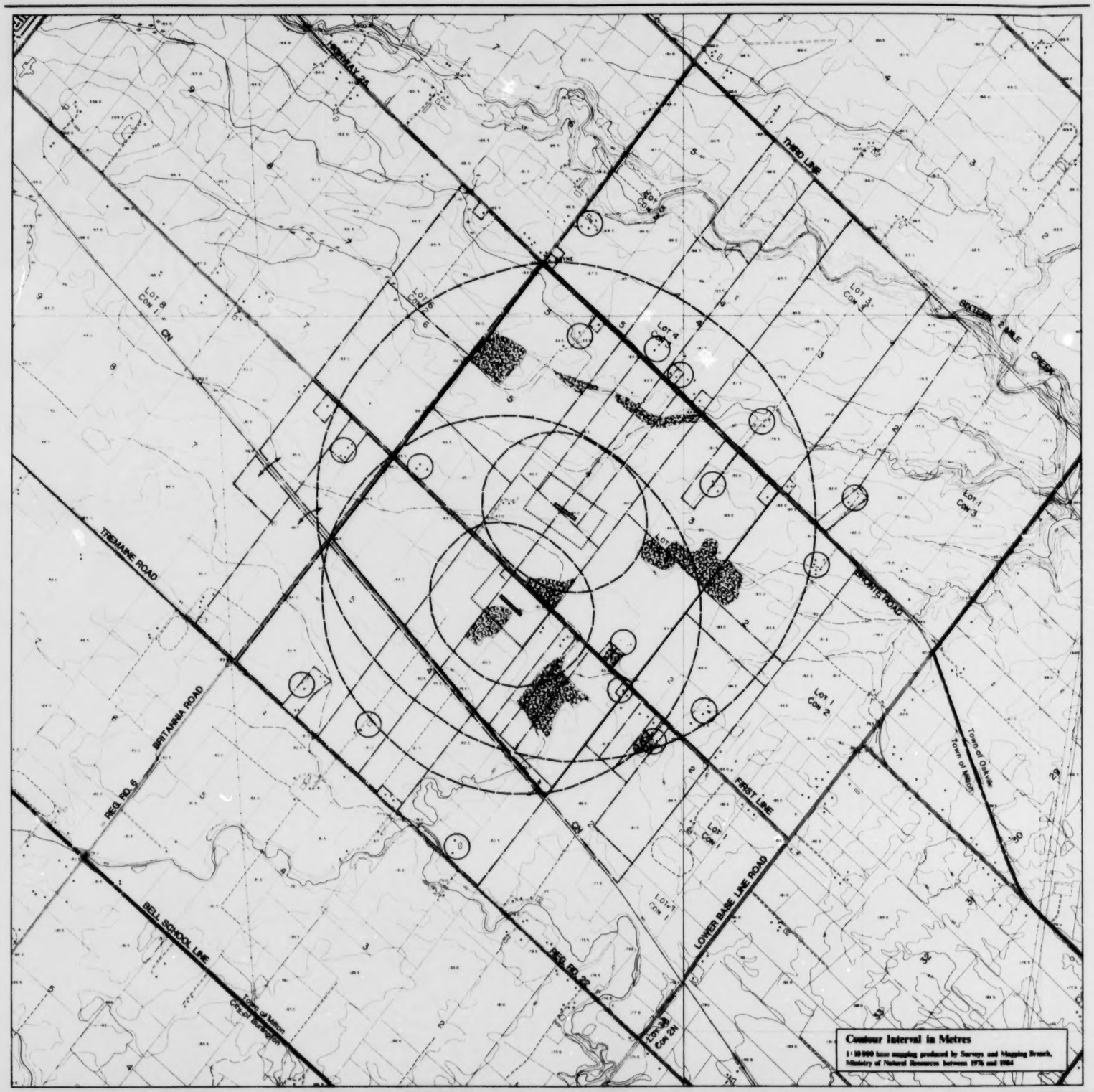
Sources:

Property boundary information from "Existing Land Use & Land Ownership CANDIDATE SITE IDENTIFICATION", maps by Leon Kentridge & Associates. (October 1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E·A 17**

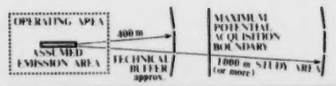


OWMC Ontario Waste Management Corporation

Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

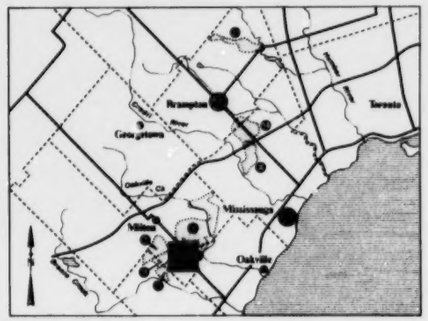
Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex



Key Map: **PI-1 North**

Lots 3, 4 and 5; Concession II; Town of Milton; Parts of Lots 3, 4 and 5; Concession I; Town of Milton, formerly in the Township of Trafalgar



Sources:

Property boundary information derived from the Assessment Rolls, Ministry of Revenue (1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E·A 18**

OWMC Ontario Waste Management Corporation

Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

Legend:

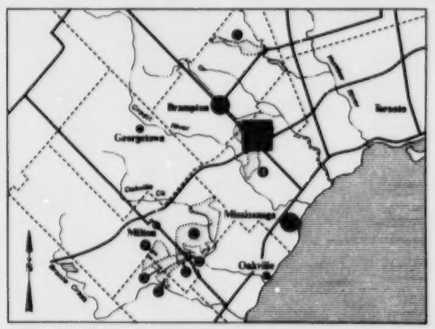
- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex

LIMIT OF LANDFILL approx. — not to scale

MAXIMUM POTENTIAL ACQUISITION BOUNDARY — 500 metres STUDY AREA

Key Map: **LF-2 North**

Lots 9 and 10; Concession I EHS (East of Hurontario Street), City of Mississauga



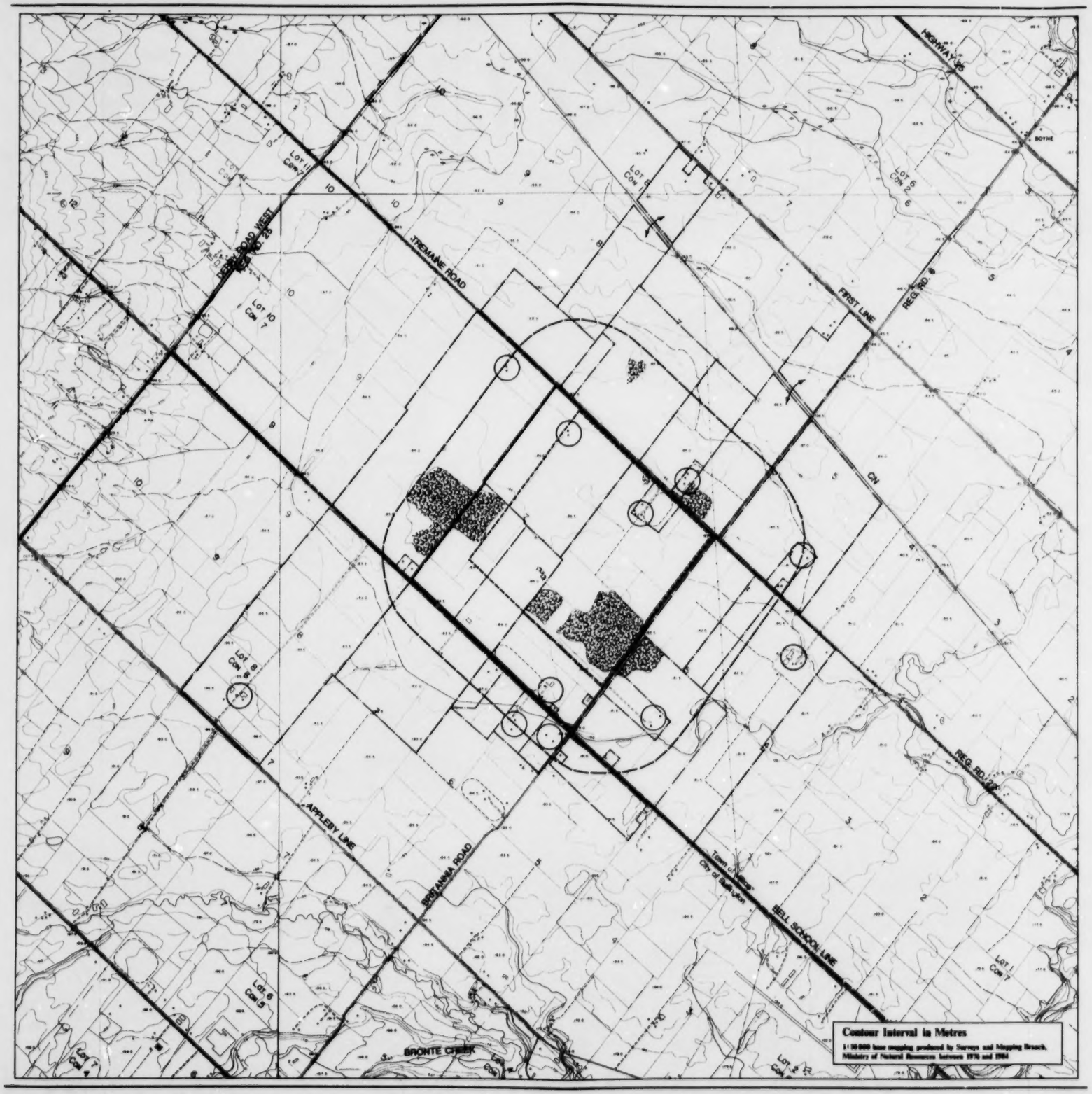
Sources:

Property boundary information derived from the Assessment Rolls, Ministry of Revenue (1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E-A 19**



OWMC Ontario Waste Management Corporation

Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

Legend:

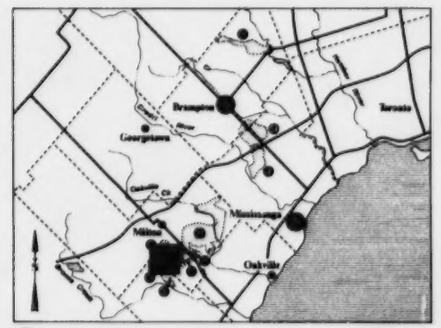
- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex

LIMITS OF LANDFILL approx. not to scale

MAXIMUM POTENTIAL ACQUISITION BOUNDARY 800 m STUDY AREA

Key Map: **LF-4 North**

Lots 6 and 7; Concession VII; Town of Milton, formerly in the Township of Nelson



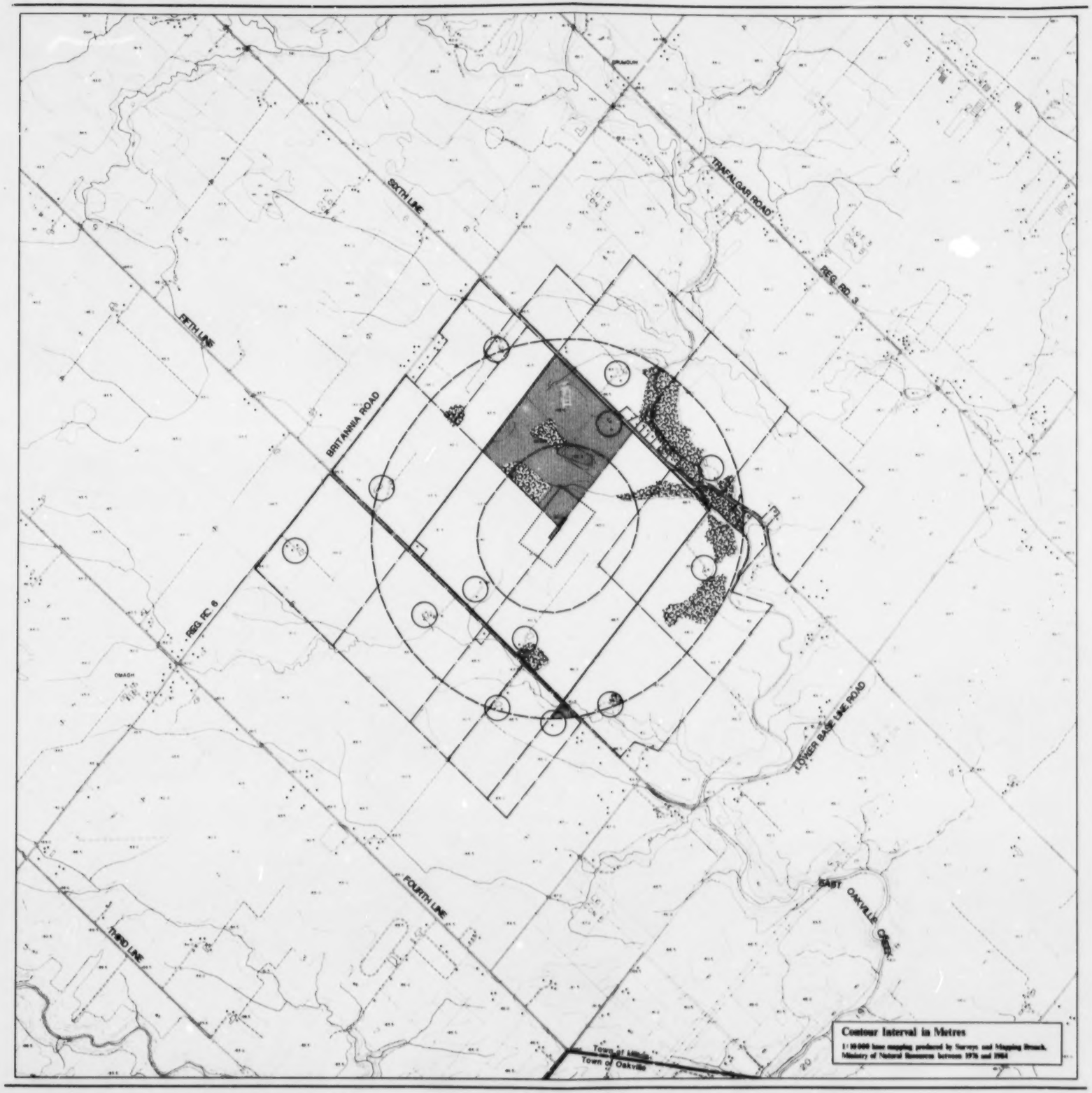
Sources:

Property boundary information derived from the Assessment Rolls, Ministry of Revenue (1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E·A 20**



OWMC Ontario Waste Management Corporation

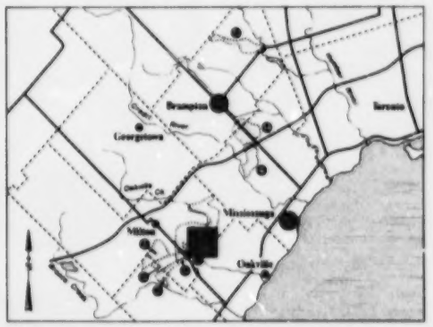
Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex

Key Map: **PI-13 North**

Lots 3 and 4; Concession VI; Town of Milton, formerly the Township of Trafalgar



Sources:

Property boundary information derived from the Assessment Rolls, Ministry of Revenue (1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E·A 21**

OWMC Ontario Waste Management Corporation

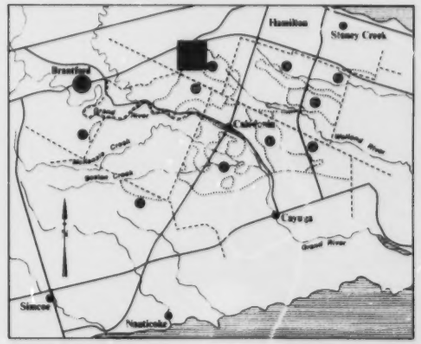
Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex

Key Map: **PI-2 West**

Part of Lots 34, 35 and 36; Concession IV; Town of Ancaster



Sources:

Property boundary information from 'Existing Land Use & Land Ownership CANDIDATE SITE IDENTIFICATION', maps by Leon Kentridge & Associates. (October 1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E·A 22**

OWMC Ontario Waste Management Corporation

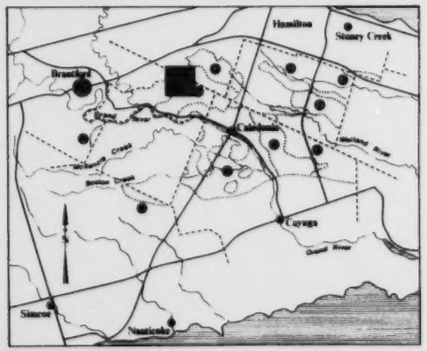
Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

Legend:

- Cultivated
- Pasture, grazing, or idle
- Non Agriculture
- Woodlots
- Property Boundary
- Farm complex

Key Map: **LF-10a West**

Lots 16, 17 and Part of Lots 15 and 18; Concession I; Township of Onondaga



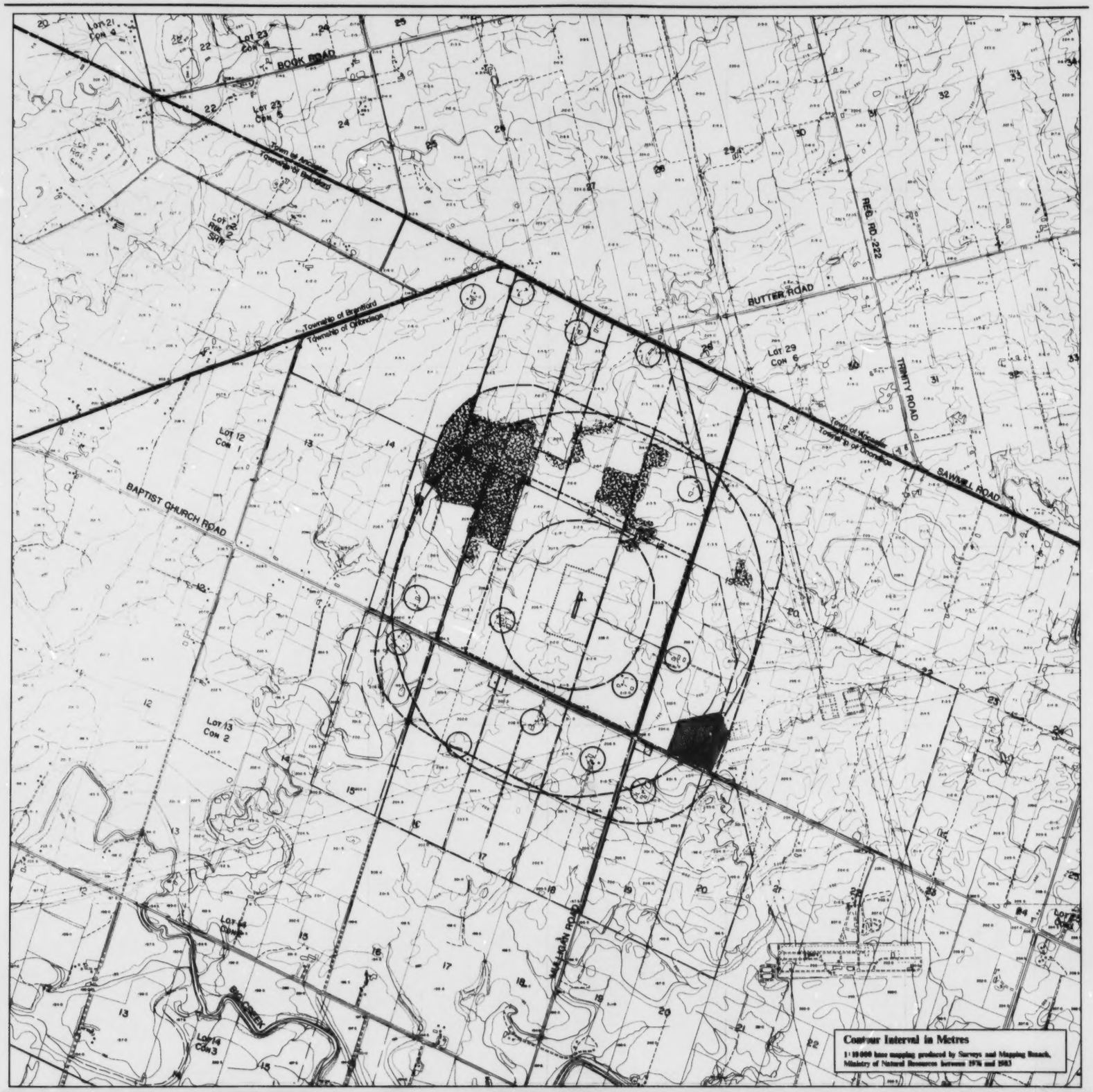
Sources:

Property boundary information from "Existing Land Use & Land Ownership CANDIDATE SITE IDENTIFICATION", maps by Leon Kentridge & Associates. (October 1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E·A 23**

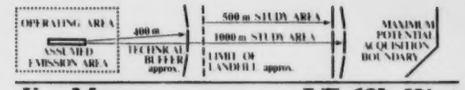


OWMC Ontario Waste Management Corporation

Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

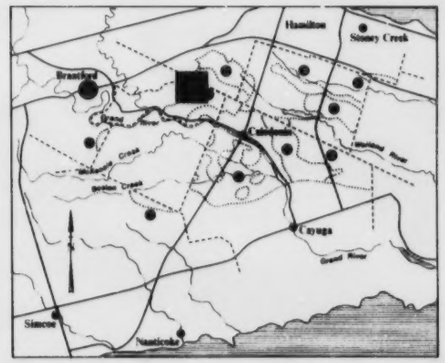
Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex



Key Map: **LF-10b West**

Lots 16, 17 and Part of Lots 15 and 18; Concession I; Township of Onondaga



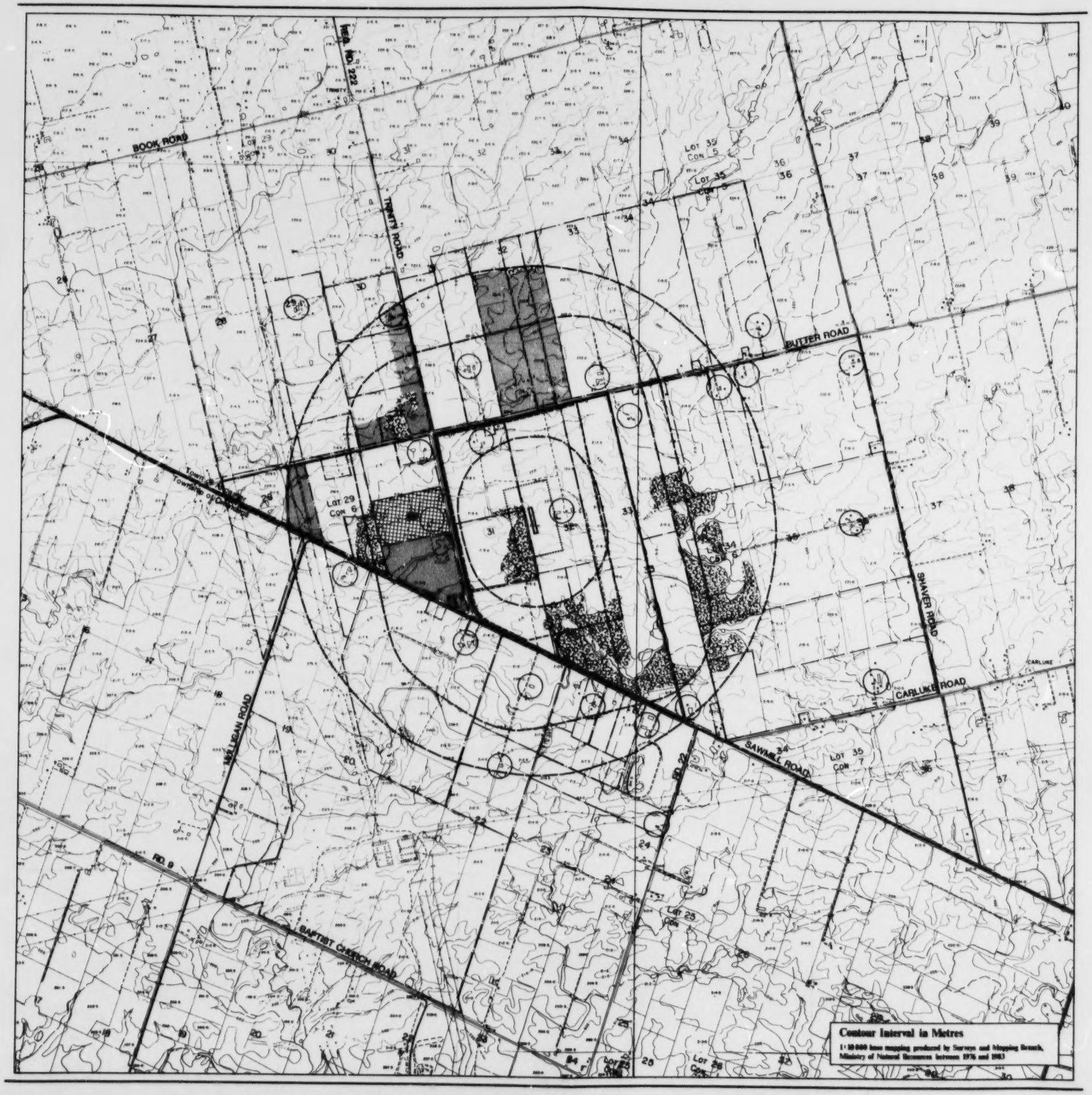
Sources:

Property boundary information from "Existing Land Use & Land Ownership CANDIDATE SITE IDENTIFICATION", maps by Leon Kentridge & Associates. (October 1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E·A 24**

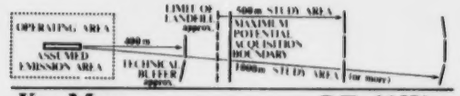


OWMC Ontario Waste Management Corporation

Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

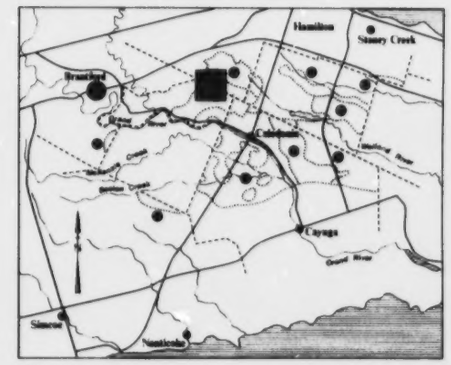
Legend:

- Cultivated
- Pasture, grazing, or idle agriculture
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex



Key Map: **LF-11 West**

Lots 31, 32 and Part of Lot 33, Concession VI; Town of Ancaster



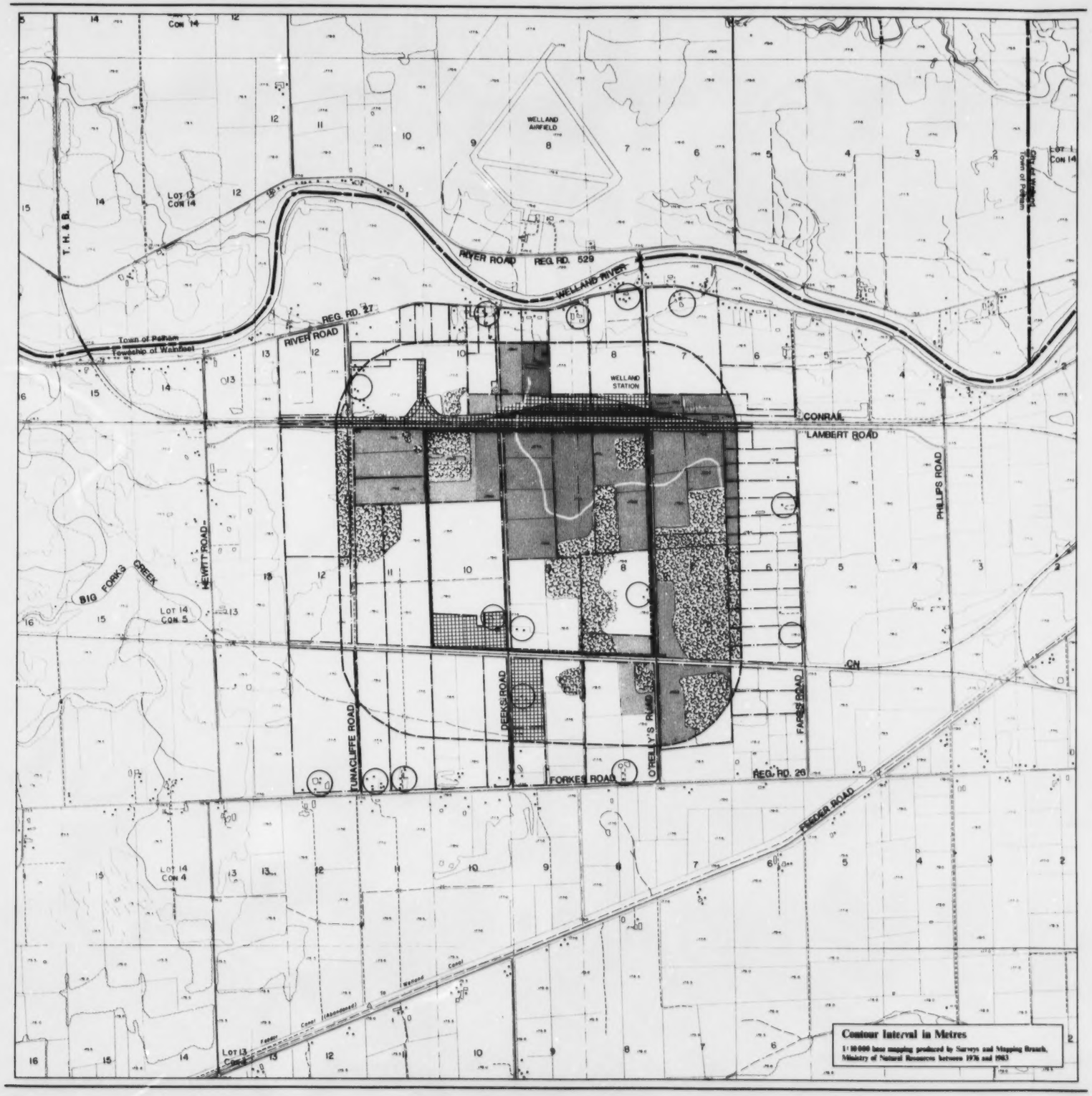
Sources:

Property boundary information from "Existing Land Use & Land Ownership CANDIDATE SITE IDENTIFICATION", maps by Leon Kentridge & Associates. (October 1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E-A 25**

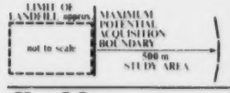


OWMC Ontario Waste Management Corporation

Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

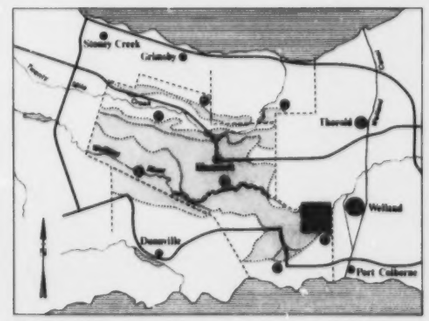
Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex



Key Map: **LF-1 Central**

Part of Lots 8, 9, and 10; Concession V; Township of Wainfleet



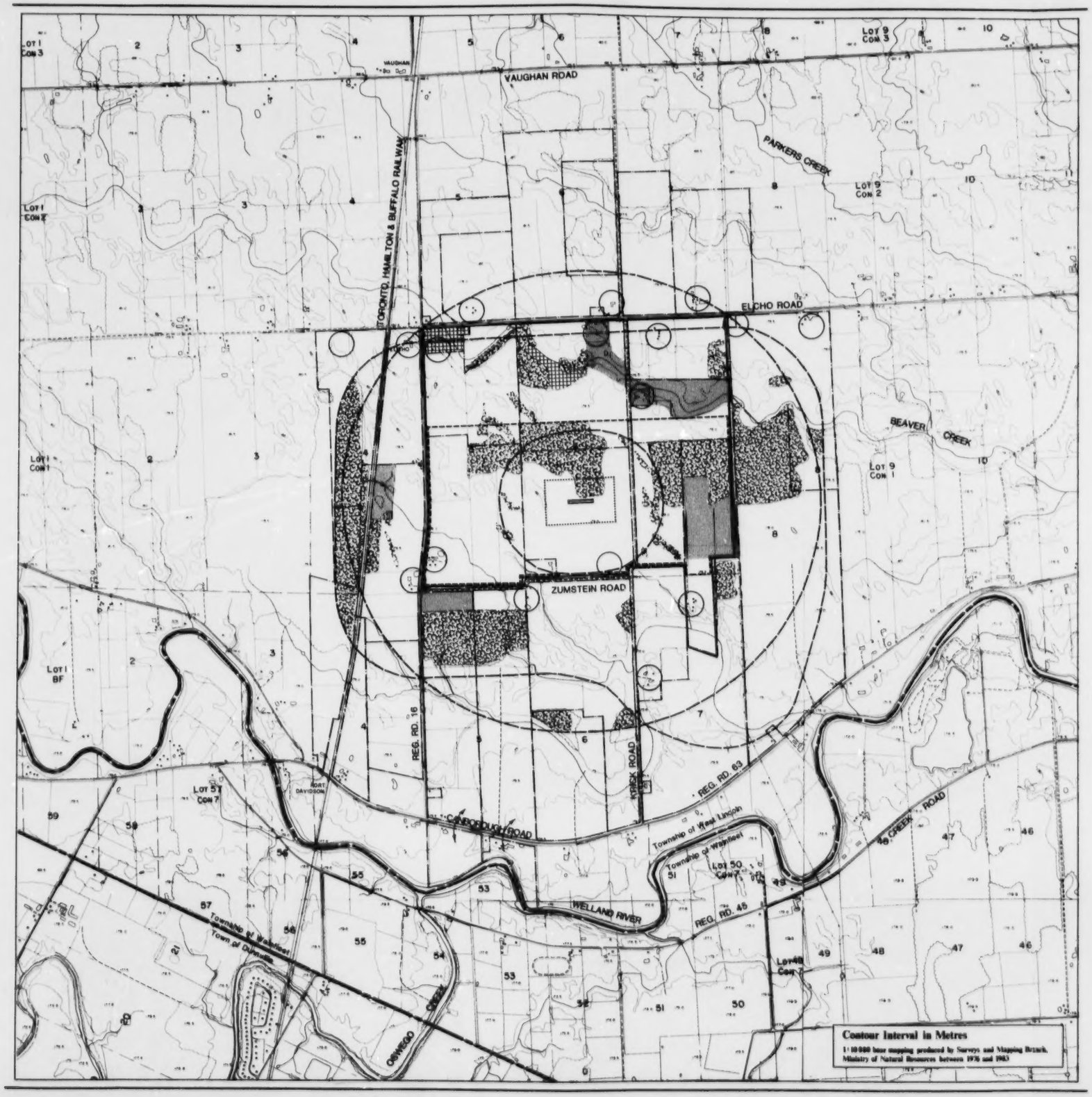
Sources:

Property boundary information from "Existing Land Use & Land Ownership CANDIDATE SITE IDENTIFICATION", maps by Leon Kentridge & Associates. (October 1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E·A 26**



OWMC Ontario Waste Management Corporation

Consultant:

ecologistics limited

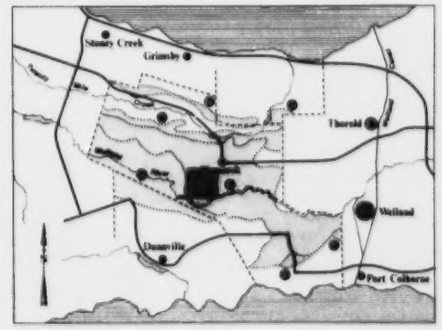
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex

Key Map: **LF-3 Central**

Lots 5, 6 and 7; Concession 1; Part of Lot 7; Broken Front Concession; Township of West Lincoln; formerly in the Township of Gainsborough



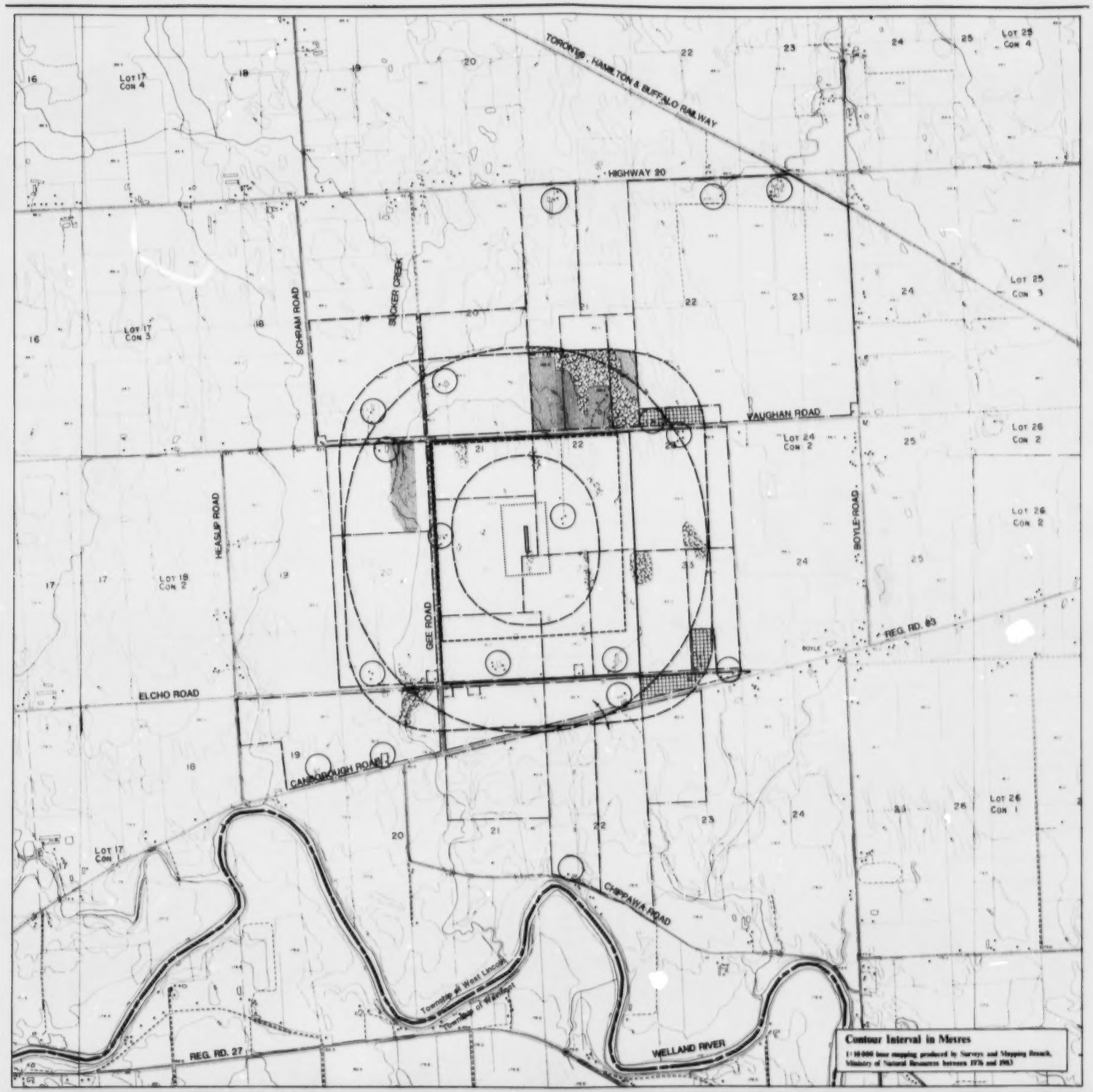
Sources:

Property boundary information derived from the Assessment Rolls, Ministry of Revenue (1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E·A 27**



OWMC Ontario Waste Management Corporation

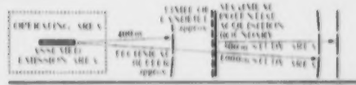
Consultant:

ecologistics limited

CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

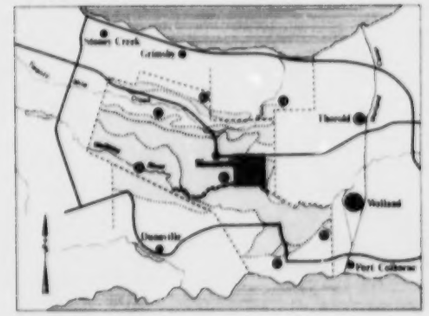
Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex



Key Map: **LF-8 Central**

Lots 21 and 22; Concession 11; Township of West Lincoln; formerly in the Township of Gainsborough



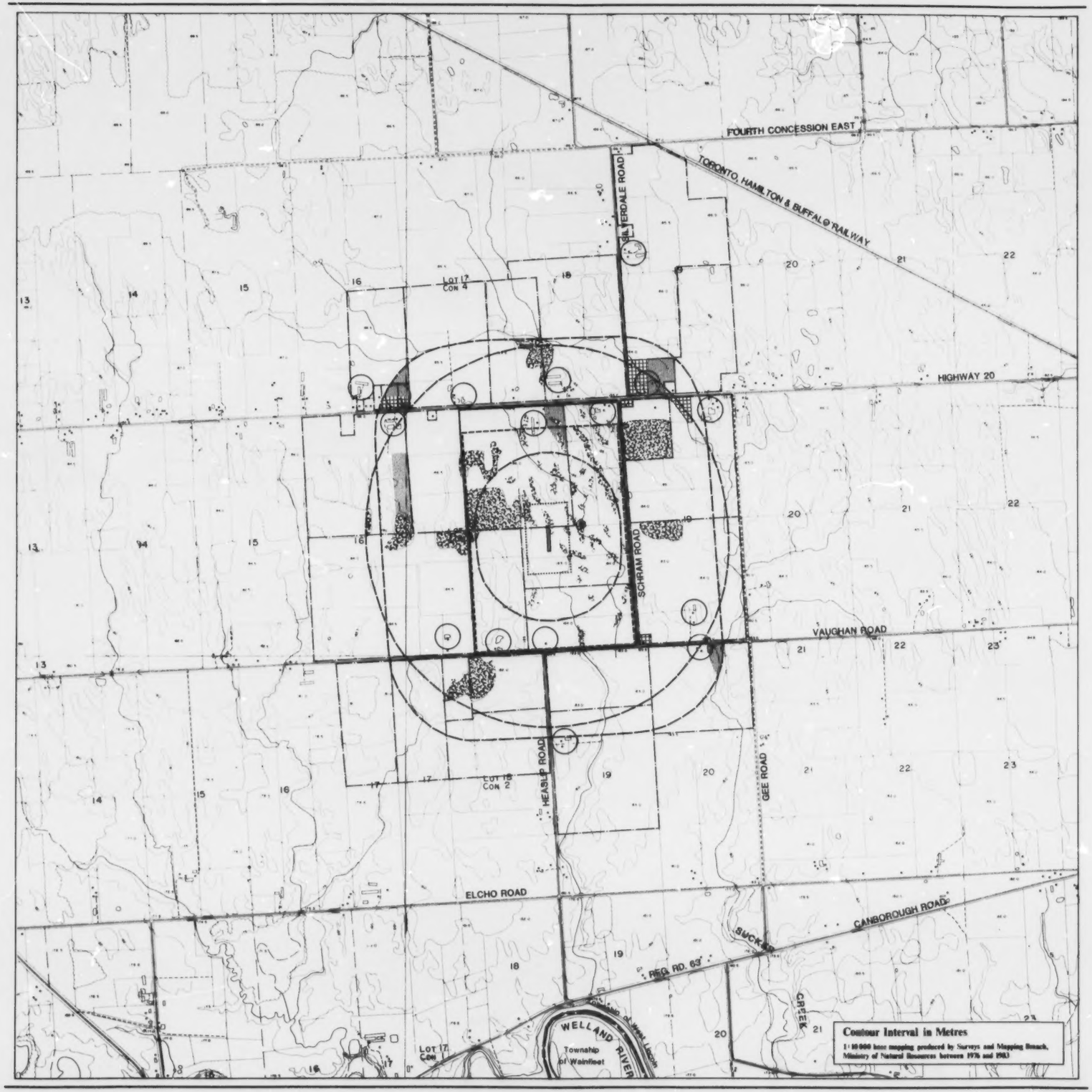
Sources:

Property boundary information from 'Existing Land Use & Land Ownership CANDIDATE SITE IDENTIFICATION', maps by Leon Kentridge & Associates. (October 1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E-A 28**

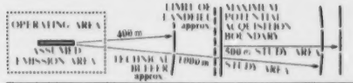


OWMC Ontario Waste Management Corporation

Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

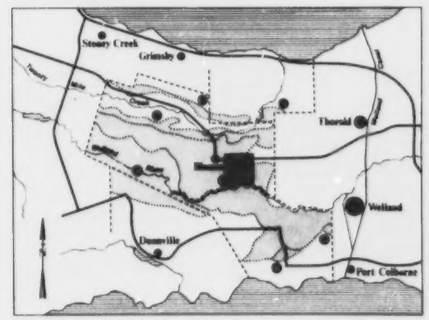
Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex



Key Map: **LF-9 Central**

Lot 18 and Part of Lot 17; Concession III; Township of West Lincoln; formerly in the Township of Gainsborough



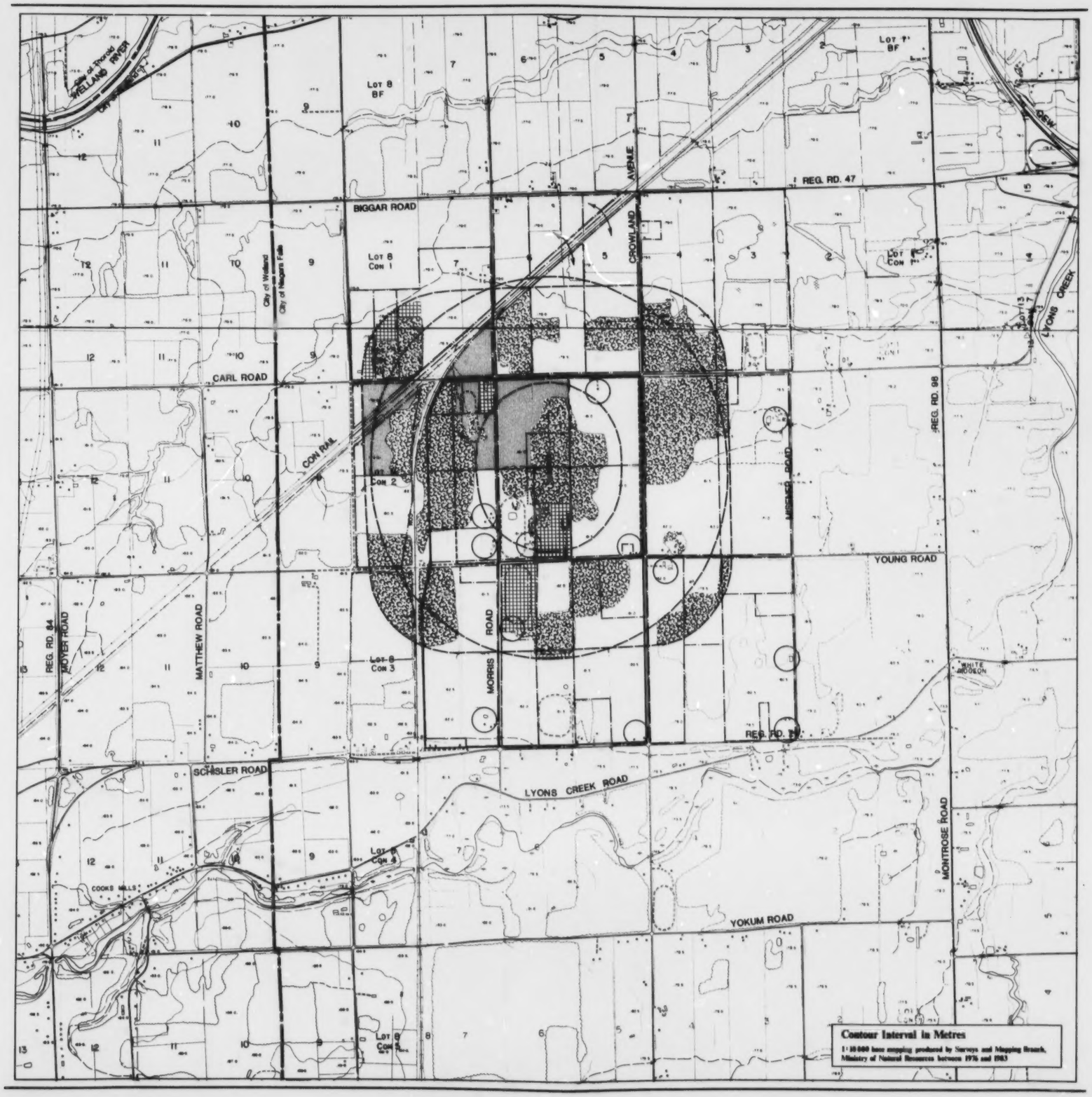
Sources:

Property boundary information derived from the Assessment Rolls, Ministry of Revenue (1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E·A 29**



OWMC Ontario Waste Management Corporation

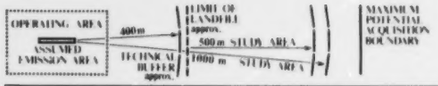
Consultant:

ecologistics limited

CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

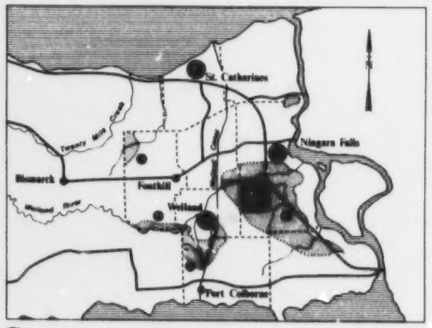
Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex



Key Map: **LF-1a East**

Lots 5, 6 and 7; Concessions II and III; City of Niagara Falls; formerly in the Township of Crowland



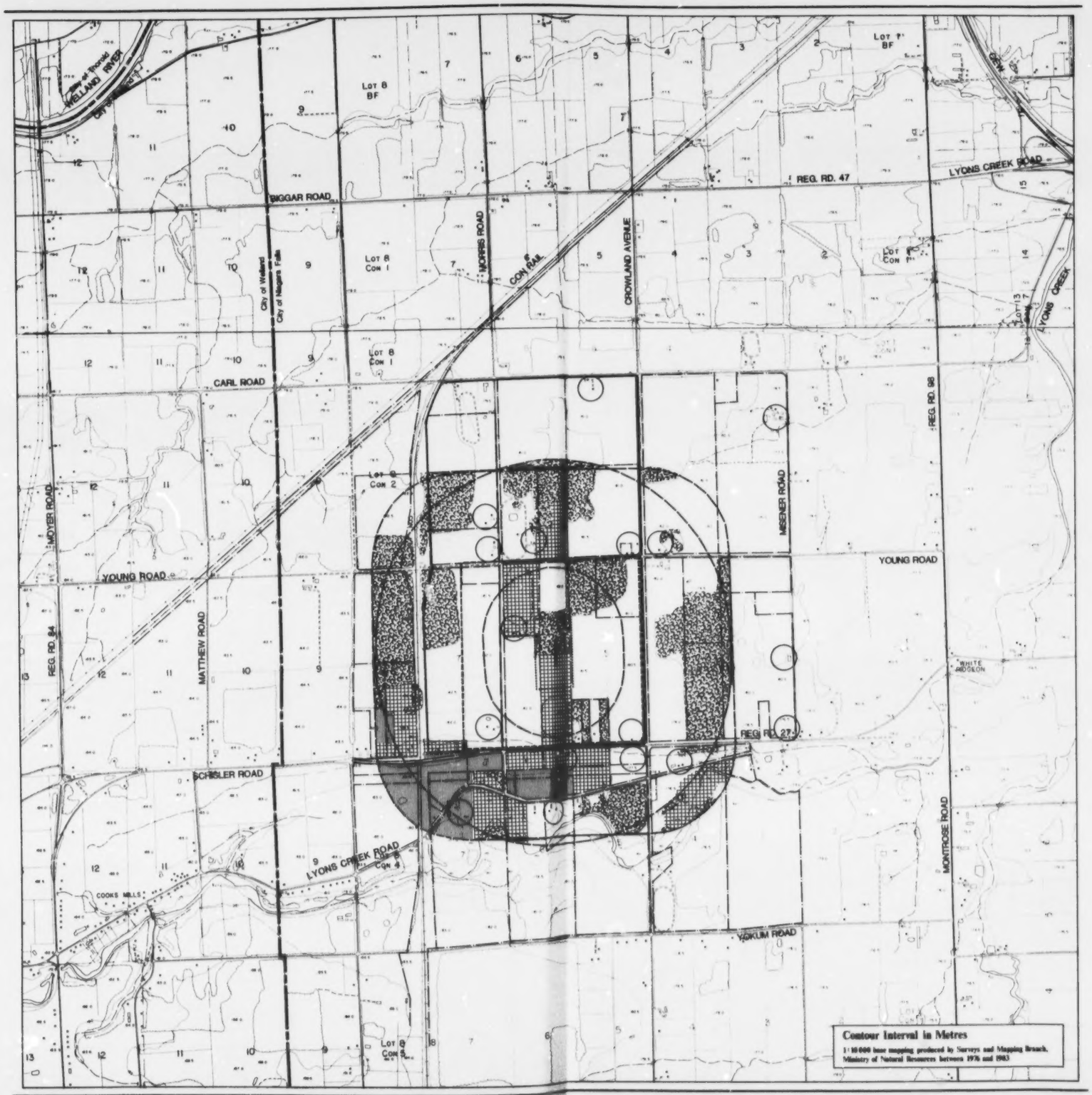
Sources:

Property boundary information derived from the Assessment Rolls, Ministry of Revenue (1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E·A 30**

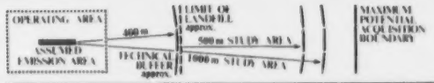


OWMC Ontario Waste Management Corporation

Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

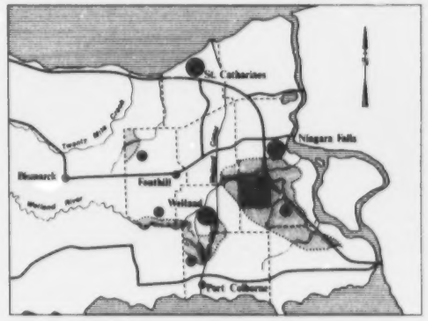
Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex



Key Map: **LF-1b East**

Lots 5, 6 and 7; Concessions II and III; City of Niagara Falls; formerly in the Township of Crowland



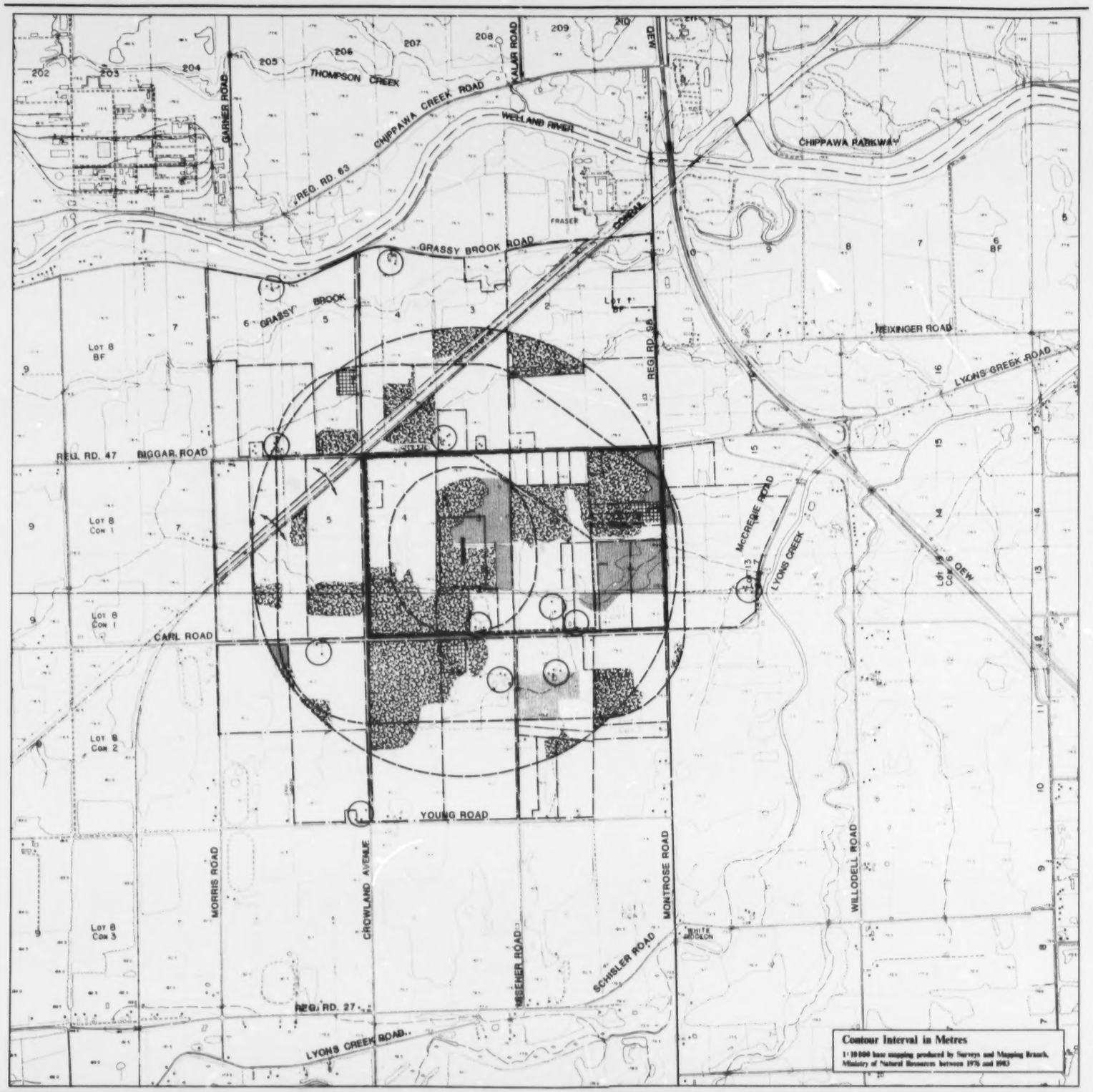
Sources:

Property boundary information derived from the Assessment Rolls, Ministry of Revenue. (1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E·A 31**

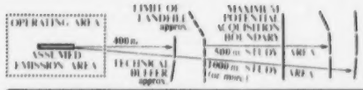


OWMC Ontario Waste Management Corporation

Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

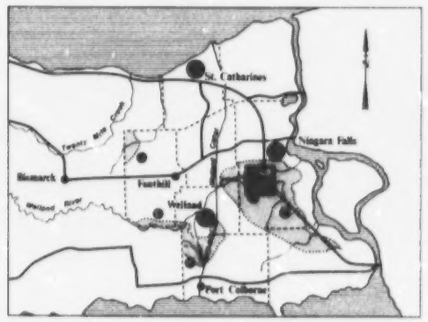
Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex



Key Map: **LF-3 East**

Lots 1, 2, 3 and 4; Concession 1; City of Niagara Falls, formerly Township of Crowland



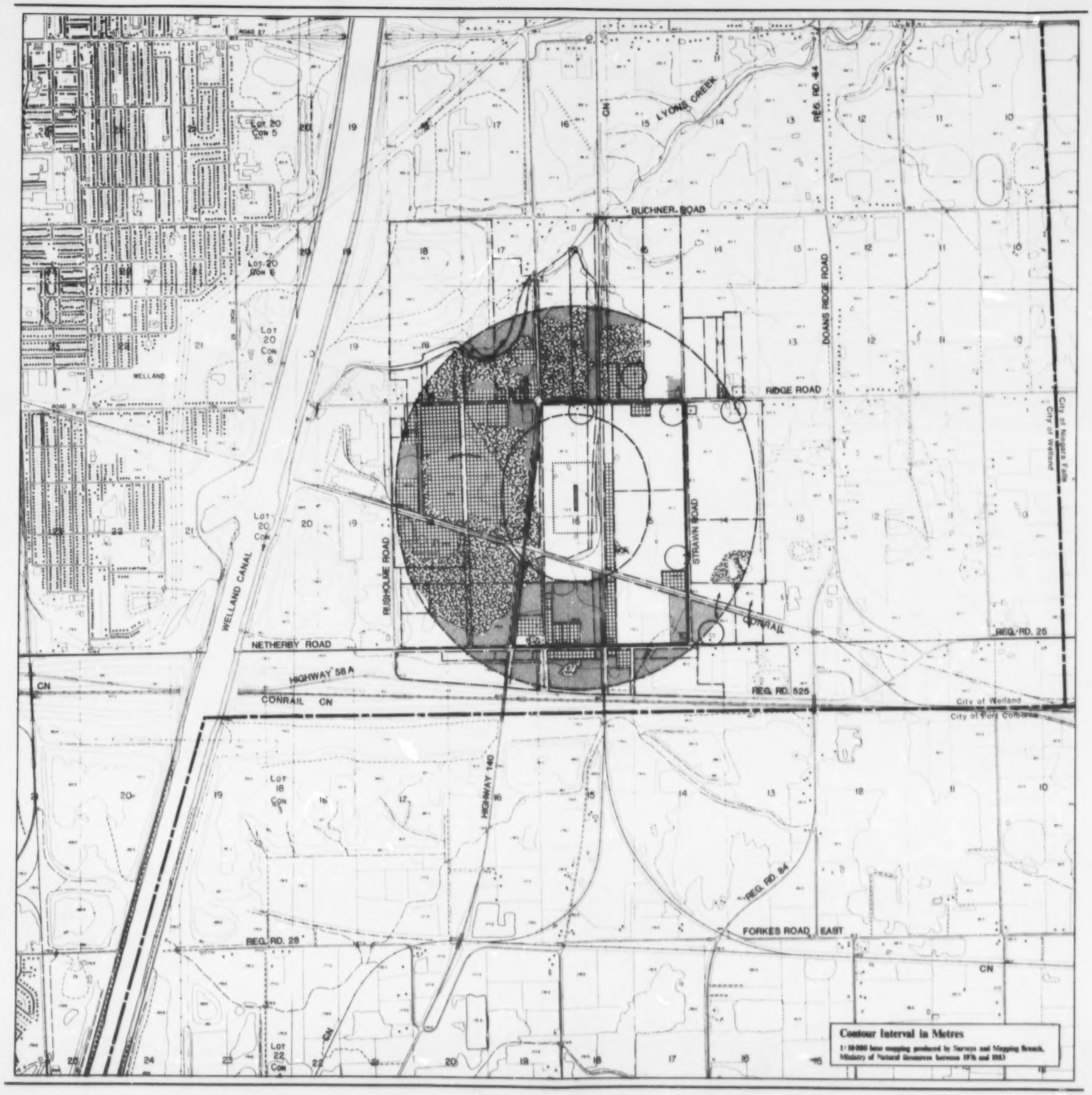
Sources:

Property boundary information from "Existing Land Use & Land Ownership CANDIDATE SITE IDENTIFICATION", maps by Leon Kentridge & Associates. (October 1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E-A 32**

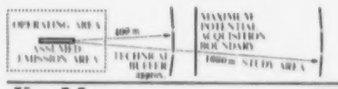


OWMC Ontario Waste Management Corporation

Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

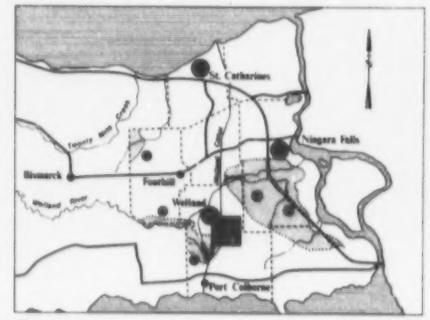
Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex



Key Map: **PI-18 East**

Lots 15, 16 and Part of Lot 17; Concession VII; City of Welland, formerly in the Township of Crowland



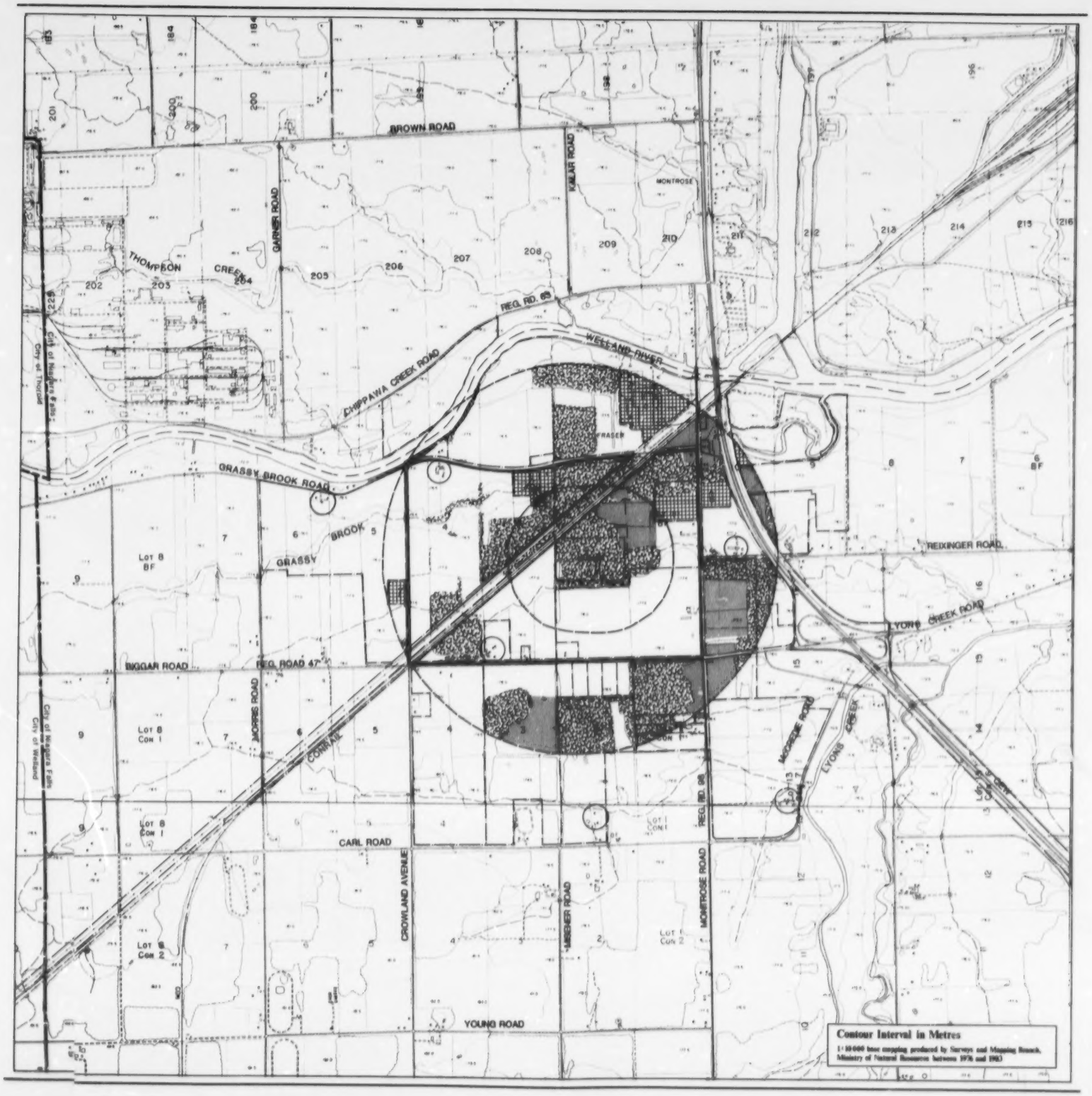
Sources:

Property boundary information from "Existing Land Use & Land Ownership CANDIDATE SITE IDENTIFICATION", maps by Leon Kentridge & Associates. (October 1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E-A 33**

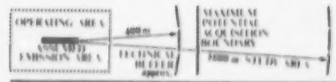


OWMC Ontario Waste Management Corporation

Consultant:
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

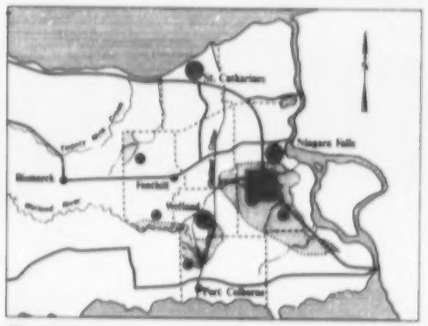
Legend:

- Cultivated
- Pasture, grazing, or idle
- Non-Agriculture
- Woodlots
- Property Boundary
- Farm complex



Key Map: **PI - 27 East**

Part of Lots 1, 2, 3, and 4; Broken Front Concession Welland River; City of Niagara Falls; formerly in the Township of Crowland



Sources:

Property boundary information derived from the Assessment Rolls, Ministry of Revenue (1984)

1000 feet 0 1000
500 metres 0 500

Agricultural Land Use CANDIDATE SITE IDENTIFICATION

October 1984 **MAP E-A 34**

TABLE 4-5

SUMMARY OF AGRICULTURAL DATA

FOR INTEGRATED SITES

SITE DATA

	EXISTING RESOURCES						FUTURE RESOURCES			
					Urban Shadow		Class I Equivalent			
Site	Site[1] Size (ha)	Cultivated Land (ha)	Number of Farm Building Complexes[2] Above Ave.	Average	No. Holdings < 20 ha	Non-Farm Houses	Hectares	% of Site Size	Land Use Designation	Public[3] Land Ownership
LF-1E	253	141	0	2	19	8	202	80	Good general agriculture	0.7
LF-3E	173	80	0	1	17	8	111	64	Good general agriculture	0
LF-8C	145	144	2	2	1	4	106	73	Rural	0
LF-9C	120	105	0	2	0	0	89	68	Rural	0
LF-3C	240	175	0	3	6	1	165	69	Rural	0
LF-10W	267	235	0	4	2	3	132	49	Rural agricultural 1 & 2	0
LF-11W	139	126	0	1	7	6	96	69	Agricultural	0
LF-4N	160	123	0	1	4	3	149	93	Agricultural	0

SITE VICINITY DATA

	EXISTING RESOURCES				FUTURE RESOURCES	
			(5 km Radius)[4]		(1 km Radius)	
Site	Number of Farm Building Complexes[2] Above Ave.	Average	Sensitive Crops ($/ha)	Livestock Density ($/40 ha)	Predominant Soil Capability Class	Predominant Land Use Designation
LF-1E	0	4	46	1382	2	Good general agriculture
LF-3E	0	6	43	1830	3	Good general agriculture
LF-8C	4	9	190	3099	2	Rural
LF-9C	4	6	147	3446	2	Rural
LF-3C	3	7	148	2754	2-3	Rural
LF-10W	1	9	170	426	4	Rural agricultural 1 and 2
LF-11W	1	12	180	769	3>4	Rural agricultural 1 and 2
LF-4N	1	4	70	1024	1	Agricultural

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[1] Site size was determined from 1:10 000 airphotos.

[2] With land situated within the acquisition area.

[3] Percent of site owned by public agencies.

[4] With land situated within the 1000 m zone of PI site.

[5] Values shown are for the 5 km radius of the incinerator site.

TABLE 4-6

SUMMARY OF AGRICULTURAL DATA

FOR PARTIALLY INTEGRATED SITES

SITE DATA

Site	EXISTING RESOURCES: Site[1] Size (ha)	Cultivated Land (ha)	Number of Farm Building Complexes[2] Above Ave.	Average	Urban Shadow: No. Holdings < 20 ha	Non-Farm Houses	FUTURE RESOURCES: Class 1 Equivalent Hectares	% of Site Size	Land Use Designation	Public[3] Land Ownership
LF-1C/ PI-18E	259	138	0	5	28	9	166	64	Rural[4], Heavy Industrial & Rural	28
LF-10W/ PI-2W	412	364	1	5	6	6	210	51	Rural agricultural 1 & 2, Industrial & Agricultural	11
LF-11W/ PI-2W	284	255	1	2	11	9	172	61	Agricultural, Industrial & Agricultural	15
LF-4N/ PI-1N	516	469	0	1	20	10	474	92	Agricultural	0
LF-2N/ PI-1A1	284	251	0	1	6	3	280	99	S.P.A.[5], Industrial	3
LF-2N/ PI-1N	511	506	0	1	21	9	476	93	S.P.A., Agricultural	1
LF-1E/ PI-27E	424	253	0	3	26	12	326	77	Good general Agriculture, Industrial	3
LF-4N/ PI-13N	326	246	0	4	5	4	293	90	Agricultural	44
LF-2N/ PI-13N	321	283	0	4	6	3	295	92	S.P.A., Agricultural	47

SITE VICINITY DATA

Site	EXISTING RESOURCES (5 km Radius)[7]: Number of Farm Building Complexes[6] Above Ave.	Average	Sensitive Crops ($/ha)	Livestock Density (#/40 ha)	FUTURE RESOURCES (1 km Radius): Predominant Soil Capability Class	Predominant Land Use Designation
LF-1C/PI-18E	2	5	32	318	3	Rural industrial, Heavy industrial
LF-10W/PI-2W	2	9	160	1251	4	Rural agricultural 1&2, Agricultural, Industrial
LF-11W/PI-2W	2	12	160	1251	4	Rural agricultural, Agricultural, Industrial
LF-4N/PI-1N	1	14	65	799	1	Agricultural
LF-2N/PI-1A1	0	7	57	24	1	S.P.A., Rural
LF-2N/PI-1N	0	13	65	799	1	S.P.A., Agricultural
LF-1E/PI-27E	1	7	42	1667	2	Good general Agriculture, Industrial
LF-4N/PI-13N	2	9	137	79	1	Agricultural
LF-2N/PI-13N	1	8	137	79	1	S.P.A., Agricultural

[1] Site size was determined from 1:10 000 airphotos.

[2] With land situated within the acquisition area.

[3] Percent of site owned by public agencies.

[4] Proposed amendment which would redesignate to industrial.

[5] S.P.A. - Special Policy Area; municipality is in the process of preparing a secondary plan and redesignating to industrial.

[6] With land situated within the 1000 m zone of PI site.

[7] Values shown are for the 5 km radius of the incinerator site.

The screening of site areas resulted in three potential sites (LF-10W, LF-1E, PI-1N) which were actually large enough to accommodate two facility locations each. Since it was not possible, on the basis of available data, to reduce the site sizes further, data was collected for the complete sites as shown in Maps E.A23, E.A24, E.A30, 3.A31 and E.A18. However, in measuring and counting features within the relevant site and site vicinity zones, double counting was avoided.

It should be noted that the number of farm complexes listed for the sites and site vicinities do not fully match with those listed in the site screening Table 3-2. This is a function of changes in the size of site areas and vicinities during refinement work in this later stage.

Also of note in Tables 4-5 and 4-6 is the data on soil capability (Class 1 equivalents) for sites LF-10W, LF-11W. The soil survey information obtained for this area indicated that the soils are primarily Classes 3 and 4. However, roadside field inspections revealed that some of the lands would be rated higher as a result of on-site testing. This is especially true for the southern portion of LF-10W. This fact was considered during the ranking of siting options.

Table 4-7 contains the agricultural data used in comparing alternative access roads to each of the siting options. For local roads the data include length, number of active farm complexes, livestock population and Class 1 equivalents. For regional roads, they include length, number of active farm complexes, livestock populations and sensitive crop values.

TABLE 4-7

SUMMARY OF AGRICULTURAL DATA ALONG ALTERNATIVE ACCESS ROUTES

Site	Access Route Description	LOCAL ROADS				REGIONAL ROADS				Rank
		Length (km)	No. of Active Farms	Livestock[1] Population (000's)	Soil Capability Class 1 Equivalent (km)	Length (km)	No. of Active Farms	Livestock Population (000's)	Sensitive Crops ($000's)	
LF-4N	to LF-4N									
	- from 401 south on Hwy. 25; west on Steeles Ave.; south on First Line Rd.; west on Britannia Rd. to LF-4N	6.4	3	14.1	6.3	3.5	2	7.8	21.7	1
	- from 401 south on Hwy. 25; west on Steeles Ave.; south on Tremaine Rd. to LF-4N	0.0	N.A.[2]	N.A.	N.A.	8.7	5	69.4	106.3	1
*	- from 401 south on Fourth Line Rd.; west on Britannia Rd. to LF-4N	3.1	7	0.4	2.9	8.4	6	8.9	100.2	2
	- from 401 south on Fourth Line Rd.; east on Derry Rd.; south on Fifth Line Rd.; west on Britannia Rd. to LF-4N	3.1	1	0.4	2.9	11.3	11	9.4	148.7	2
	- from 401 south on Trafalgar Rd.; west on Britannia Rd. to LF-4N	0.0	N.A.	N.A.	N.A.	14.2	26	10.3	255.4	3
	- from 403 north on Winston Churchill Blvd.; west on Britannia Rd. to LF-4N	0.0	N.A.	N.A.	N.A.	18.8	16	10.0	764.3	3
	- from QEW north on Trafalgar Rd.; west on Britannia Rd. to LF-4N	0.0	N.A.	N.A.	N.A.	21.4	23	11.8	613.3	3
*	- from QEW north on Hwy. 25 (Bronte Rd.); west on Britannia Rd. to LF-4N	0.0	N.A.	N.A.	N.A.	14.5	17	29.0	97.6	3
	LF-4N to PI-1N									
*	- east on Britannia Rd. to PI-1N	0.0	N.A.	N.A.	N.A.	1.0	1	2.1	5.9	—
	LF-4N to PI-13N									
*	- east on Britannia Rd.; south on Fifth Line Rd. to PI-13N	0.8	1	3	0.5	7.2	9	8.9	74.5	—
LF-2N	to LF-2N									
*	- from 401 north on Hwy. 10 to LF-2N	0.0	N.A.	N.A.	N.A.	1.0	3	0.08	2.7	2
	- from 410 west on Derry Rd. to LF-2N	0.0	N.A.	N.A.	N.A.	1.0	0	0.08	2.7	1
	LF-2N to PI-1A1									
	- east on Derry Rd. East; north on Airport Rd. to PI-1A1	0.0	N.A.	N.A.	N.A.	15.6	3	1.4	102.9	1
*	- east on Derry Rd. East; north on Dixie Rd.; east on Steeles Ave.; north on Airport Rd. to PI-1A1	0.0	N.A.	N.A.	N.A.	14.8	5	1.3	149.0	2
	LF-2N to PI-13N									
	- south on Hwy. 10; west on 401; south on Trafalgar Rd.; west on Britannia Rd.; south on Fifth Line Rd. to PI-13N	0.8	1	0.3	0.3	8.2	19	1.2	183.6	3
*	- south on Hwy. 10; west on 401; south on Fourth Line Rd.; east on Britannia Rd.; south on Fifth Line Rd. to PI-13N	3.9	6	0.6	3.7	5.0	9	0.7	72.0	2
	- south on Hwy. 10; west on 401; south on Fourth Line Rd.; east on Derry Rd.; south on Fifth Line Rd. to PI-13N	3.9	2	0.6	3.7	5.0	6	0.6	76.9	1
	LF-2N to PI-1N									
	- south on Hwy. 10; west on 401; south on Trafalgar Rd.; west on Britannia Rd. to PI-1N	0.0	N.A.	N.A.	N.A.	12.2	20	1.8	240.3	2
*	- south on Hwy. 10; west on 401; south on Fourth Line Rd.; west on Britannia Rd. to PI-1N	3.1	6	0.4	2.9	6.4	10	2.6	85.1	3
	- south on Hwy. 10; west on 401; south on Hwy. 25; west on Steeles Ave.; south on First Line Rd. to PI-1N	6.4	3	14.1	6.3	2.7	3	4.0	13.5	3
	- south on Hwy. 10; west on 401; south on Hwy. 25; west on Steeles Ave.; south on Tremaine Rd.; east on Britannia Rd. to PI-1N	0.0	N.A.	N.A.	N.A.	10.6	13	71.6	114.8	1

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[1] 2 km wide bands
[2] N.A. - not applicable, i.e. route is regional and not local
* preferred access routes

Site	Access Route Description	LOCAL ROADS				REGIONAL ROADS				Rank
		Length (km)	No. of Active Farms	Livestock Population (000's)	Soil Capability Class 1 Equivalent (km)	Length (km)	No. of Active Farms	Livestock Population (000's)	Sensitive Crops ($000's)	
PI-1N	to PI-1N									
	- from 401 south on Hwy. 25; west on Steeles Ave.; south on First Line Rd. to PI-1N	6.4	3	14.1	6.3	4.5	0	9.9	27.6	2
	- from 401 south on Hwy. 25; west on Steeles Ave.; south on Tremaine Rd.; east on Britannia Rd. to PI-1N	0.0	N.A.	N.A.	N.A.	9.7	10	71.5	112.1	2
*	- from 401 south on Fourth Line Rd.; west on Britannia Rd. to PI-1N	3.1	6	0.4	2.9	5.5	7	2.5	82.4	1
	- from 401 south on Trafalgar Rd.; west on Britannia Rd. to PI-1N	0.0	N.A.	N.A.	N.A.	11.3	17	3.6	237.6	3
	- from 403 north on Winston Churchill Blvd.; west on Britannia Rd. to PI-1N	0.0	N.A.	N.A.	N.A.	15.9	15	3.7	746.6	3
	- from QEW north on Trafalgar Rd.; west on Britannia Rd. to PI-1N	0.0	N.A.	N.A.	N.A.	18.5	22	5.4	595.6	3
*	- from QEW north on Hwy. 25 (Bronte Rd.) to PI-1N	0.0	N.A.	N.A.	N.A.	9.7	13	20.2	62.4	1
PI-13N	to PI-13N									
*	- from 401 south on Fourth Line Rd.; east on Britannia Rd.; south on Fifth Line Rd. to PI-13N	3.9	6	0.6	3.7	4.0	6	0.6	69.3	2
	- from 401 south on Fourth Line Rd.; east on Derry Rd.; south on Fifth Line Rd. to PI-13N	3.9	2	0.6	3.7	4.0	3	0.5	74.2	1
	- from 401 south on Trafalgar Rd.; west on Britannia Rd.; south on Fifth Line Rd.; to PI-13N	0.8	1	0.3	0.5	6.9	15	1.1	170.9	3
	- from 403 north on Winston Churchill Blvd.; west on Britannia Rd.; south on Fifth Line Rd. to PI-13N	0.8	1	0.3	0.5	11.6	7	1.1	690.0	3
	- from QEW north on Trafalgar Rd.; west on Britannia Rd.; south on Fifth Line Rd. to PI-13N	0.8	1	0.3	0.5	14.5	15	3.0	543.7	3
*	- from QEW north on Hwy. 25 (Bronte Rd.); east on Britannia Rd.; south on Fifth Line Rd. to PI-13N	0.8	1	0.3	0.5	15.9	22	24.5	92.9	3
PI-1A1	to PI-1A1									
	- from 401 north on Hurontario St.; east on Derry Rd. East; north on Airport Rd. to PI-1A1	0.0	N.A.	N.A.	N.A.	19.6	8	1.7	114.6	3
*	- from 401 north on Hurontario St.; east on Derry Rd. East; north on Dixie Rd.; east on Steeles Ave.; north on Airport Rd. to PI-1A1	0.0	N.A.	N.A.	N.A.	19.6	9	1.7	166.4	3
	- from 410 east on Derry Rd. East; north on Airport Rd. to PI-1A1	0.0	N.A.	N.A.	N.A.	15.0	3	1.4	101.6	1
*	- from 410 east on Derry Rd. East; north on Dixie Rd.; east on Steeles Ave.; north on Airport Rd. to PI-1A1	0.0	N.A.	N.A.	N.A.	15.0	4	1.3	153.4	2
LF-10W	to LF-10W									
*	- from 403 west on Hwy. 2; south on Regional Rd. 22; west on Sawmill Rd. (local road) to LF-10W	0.8	2	0.08	0.5	8.5	14	43.9	264.5	--
	LF-10W to PI-2W									
*	- east on Sawmill Rd. (local road); north on Regional Rd. 222; east on Hwy. 2 to PI-2W	1.3	2	3.6	0.8	7.7	14	38.0	254.8	--
LF-11W	to LF-11W									
*	- from 403 west on Hwy. 2; south on Regional Rd. 222 to LF-1.W	0.0	N.A.	N.A.	N.A.	7.4	13	38.7	238.4	--
	LF-11W to PI-2W									
*	- north on Regional Rd. 222; east on Hwy. 2/53 to PI-2W	0.5	0	3.5	0.3	6.6	13	34.3	236.2	--

Site	Access Route Description	LOCAL ROADS				REGIONAL ROADS				Rank
		Length (km)	No. of Active Farms	Livestock Population (000's)	Soil Capability Class 1 Equivalent (km)	Length (km)	No. of Active Farms	Livestock Population (000's)	Sensitive Crops ($000's)	
PI-2W	to PI-2W									
*	- from 403 west on Hwy. 2; south on Shaver Rd. (local road) to PI-2W	0.5	0	3.5	0.3	0.8	0	5.9	9.6	--
LF-1C	to LF-1C									
*	- from QEW south on Regional Rd. 24 (Victoria Ave./Vineland Townline Rd.); east on Regional Rd. 23 (Forkes Rd.); north on O'Reilly's Rd. (local road) to LF-1C	0.8	0	9.8	0.5	32.7	45	364.5	2,277.5	3
	- from 406 (proposed) east on Regional Rd. 27 (East Main St.); south on Hwy. 140; west on Netherby Rd. (local road); south on Rusholme Rd. (local road); west on Townline Rd.; south on Hwy. 58; west on Regional Rd. 23 (Forkes Rd.); north on O'Reilly's Rd. (local road) to LF-1C	1.3	0	9.8	0.8	14.2	15	23.8	116.5	1
	- from 406 (existing) south on Regional Rd. 50 (Hwy. 58); east on Division St. (Regional Rd. 527); north on Burgar St. (Regional Rd. 527); east on Regional Rd. 27 (East Main St.); south on Hwy. 140; south on Rusholme Rd. (local road); west on Netherby Rd. (local road); west on Townline Rd. ; south on Hwy. 58; west on Regional Rd. 23 (Forkes Rd.); north on O'Reilly's Rd. (local road) to LF-1C	1.3	0	9.8	0.8	21.1	15	23.8	116.5	2
	LF-1C to PI-18E									
*	- south on O'Reilly's Rd. (local road); east on Regional Rd. 23 (Forkes Rd.); north on Hwy. 58; east on Townline Rd.; north on Rusholme Rd. (local road); east on Netherby Rd. (local road); north on Hwy. 140 to PI-18E	1.3	0	9.8	0.8	10.0	13	23.7	87.4	--
LF-3C	to LF-3C									
*	- from QEW south on Vineland Townline Rd. (Regional Rd. 24); west on Hwy. 20; south on Regional Rd. 27; west on Elcho Rd. (local road) to LF-3C	3.2	13	36.1	2.1	28.8	41	486.0	2,007.0	3
	- from QEW south on Vineland Townline Rd. (Regional Rd. 24); west on Canborough Rd.; north on Regional Rd. 27; west on Elcho Rd. (local road) to LF-3C	3.2	13	36.1	2.1	27.9	32	278.5	2,182.6	3
	- from QEW south on Regional Rd. 18 (Beamsville Rd.); west on Regional Rd. 69 (Twenty Mile Rd.); south on Regional Rd. 569; south on Hwy. 20; south on Regional Rd. 27; west on Elcho Rd. (local road) to LF-3C	3.2	13	36.1	2.3	22.7	33	1,348.6	2,059.8	3
	- from QEW south on Regional Rd. 14; south on Regional Rd. 714; east on Regional Rd. 73; south on Regional Rd. 14; east on Hwy. 20; south on Regional Rd. 27; west on Elcho Rd. (local road) to LF-3C	3.2	13	36.1	2.3	23.8	36	571.1	707.8	2
	- from QEW south on Regional Rd. 14; south on Regional Rd. 714; east on Regional Rd. 73; south on Regional Rd. 14; south on Regional Rd. 16 to LF-3C	0.0	N.A.	N.A.	N.A.	21.9	40	524.5	634.1	1
	- from QEW south on Regional Rd. 12; east on Hwy. 20; south on Regional Rd. 27; west on Elcho Rd. (local road) to LF-3C	3.2	13	36.1	2.3	25.3	42	842.1	1,128.1	3
	- from QEW south on Regional Rd. 12; east on Hwy. 20; south on Regional Rd. 14; south on Regional Rd. 16 to LF-3C	0.0	N.A.	N.A.	N.A.	18.2	50	677.2	944.1	2
	- from QEW south on Regional Rd. 14; east on Regional Rd. 81; south on Regional Rd. 514; south on Regional Rd. 14; south on Regional Rd. 16 to LF-3C	0.0	N.A.	N.A.	N.A.	22.2	39	514.2	1,148.8	3
	- from QEW south on Regional Rd. 14; east on Regional Rd. 81; south on Regional Rd. 514; south on Regional Rd. 14; east on Hwy. 20 south on Regional Rd. 27; west on Elcho Rd. (local road) to LF-3C	3.2	13	36.1	2.3	24.2	32	560.8	1,222.4	3

Site	Access Route Description	LOCAL ROADS				REGIONAL ROADS				Rank
		Length (km)	No. of Active Farms	Livestock Population (000's)	Soil Capability Class 1 Equivalent (km)	Length (km)	No. of Active Farms	Livestock Population (000's)	Sensitive Crops ($000's)	
LF-8C	to LF-8C									
*	- from QEW south on Vineland Townline Rd. (Regional Rd. 24); west on Hwy. 20; south on Gee Rd. (local road) to LF-8C	1.4	2	40.0	1.0	20.4	20	285.4	1,797.9	2
	- from QEW south on Vineland Twp. Rd. (Regional Rd. 24); west on Canborough Rd. to Elcho Rd. to LF-8C	0.6	0	0.3	0.5	22.5	28	224.0	2,035.7	3
	- from QEW south on Regional Rd. 18; west on Regional Rd. 69; south on Regional Rd. 569; south on Hwy. 20; south on Gee Rd. to LF-8C	1.4	2	40.0	1.0	24.3	49	1,392.8	2,090.0	3
	- from QEW south on Regional Rd. 14; south on Regional Rd. 714; east on Regional Rd. 73; south on Regional Rd. 14; east on Hwy. 20; south on Gee Rd. (local road) to LF-8C	1.4	2	40.0	1.0	25.4	50	615.4	738.0	1
	- from QEW south on Regional Rd. 12; east on Hwy. 20; south on Gee Rd. (local road) to LF-8C	1.4	2	40.0	1.0	26.9	58	886.3	1,158.4	3
	- from QEW south on Regional Rd. 14; east on Regional Rd. 81; south on Regional Rd. 514; south on Regional Rd. 14; east on Hwy. 20; south on Gee Rd. (local road) to LF-8C	1.4	2	40.0	1.0	23.8	48	605.1	1,252.7	3
LF-9C	to LF-9C									
*	- from QEW south on Vineland Twp. Rd. (Regional Rd. 24); west on Hwy. 20 to LF-9C	0.0	N.A.	N.A.	N.A.	21.1	22	301.2	1,813.3	1
	- from QEW south on Regional Rd. 18; west on Regional Rd. 69; south on Regional Rd. 569; south on Hwy. 20 to LF-9C	0.0	N.A.	N.A.	N.A.	22.7	44	1,353.3	2,051.6	3
	- from QEW south on Regional Rd. 14; south on Regional Rd. 714; east on Regional Rd. 73; south on Regional Rd. 14; east on Hwy. 20 to LF-9C	0.0	N.A.	N.A.	N.A.	23.8	45	575.8	699.6	1
	- from QEW south on Regional Rd. 12; east on Hwy. 20 to LF-9C	0.0	N.A.	N.A.	N.A.	25.3	53	681.2	1,027.2	2
	- from QEW south on Regional Rd. 14; east on Regional Rd. 81; south on Regional Rd. 514; south on Regional Rd. 14; east on Hwy. 20 to LF-9C	0.0	N.A.	N.A.	N.A.	24.2	43	565.5	1,214.2	3
LF-1E	to LF-1E									
	- from 406 (existing) south on Hwy. 58 (Regional Rd. 50); east on Division St. (Regional Rd. 527); north on Burgar St. (Regional Rd. 527); east on Regional Rd. 27 to LF-1E	0.0	N.A.	N.A.	N.A.	11.8	0	7.7	42.6	3
*	- from QEW west on Regional Rd. 47 (Lyon Creek Rd.); south on Regional Rd. 98 (Montrose Rd.); west on Carl Rd. to LF-1E	1.6	3	12.6	1.3	1.6	0	17.3	13.3	1
	- from 406 (proposed) east on Regional Rd. 27 to LF-1E	0.0	N.A.	N.A.	N.A.	4.8	0	7.7	42.6	2
	LF-1E to PI-27E									
*	- east on Carl Rd. (local road); north on Regional Rd. 98 (Montrose Rd.); west on Biggar Rd. (Regional Rd. 47) to PI-27E	1.6	2	12.6	1.3	1.0	0	10.4	8.0	--
PI-18E	to PI-18E									
*	- from 406 (proposed) east on Regional Rd. 27 (East Main St.); south on Hwy. 140 to PI-18E	0.0	N.A.	N.A.	N.A.	2.7	0	0.04	19.2	1
	- from 406 (existing) south on Regional Rd. 50 (Hwy. 58); east on Division St. (Regional Rd. 527); north on Burgar St. (Regional Rd. 527); east on Regional Rd. 27 (East Main St.); south on Hwy. 140 to PI-18E	0.0	N.A.	N.A.	N.A.	9.7	0	0.04	19.2	2

Site	Access Route Description	LOCAL ROADS				REGIONAL ROADS				Rank
		Length (km)	No. of Active Farms	Livestock Population (000's)	Soil Capability Class 1 Equivalent (km)	Length (km)	No. of Active Farms	Livestock Population (000's)	Sensitive Crops ($000's)	
LF-3E	to LF-3E									
	- from 406 (existing) south on Hwy. 58 (Regional Rd. 50); east on Division St. (Regional Rd. 527); north on Burgar St. (Regional Rd. 527); east on Regional Rd. 27; north on Regional Rd. 84 (Moyer Rd.) east on Bigger Rd. (Regional Rd. 47) to LF-3E	0.0	N.A.	N.A.	N.A.	16.4	5	22.7	81.3	3
*	- from QEW west on Regional Rd. 47 (Lyons Creek Rd./Bigger Rd.) to LF-3E	0.0	N.A.	N.A.	N.A.	1.0	0	10.4	8.0	1
	- from 406 (proposed) east on Regional Rd. 27; north on Regional Rd. 84 (Moyer Rd.); east on Bigger Rd. (Regional Rd. 47) to LF-3E	0.0	N.A.	N.A.	N.A.	9.5	5	22.7	81.3	2
PI-27E	to PI-27E									
	- from 406 (existing) south on Hwy. 58 (Regional Rd. 50); east on Division St. (Regional Rd. 527); north on Burgar St. (Regional Rd. 527); east on Regional Rd. 27; north on Regional Rd. 84 (Moyer Rd.); west on Bigger Rd. to PI-27E	0.0	N.A.	N.A.	N.A.	16.4	6	22.7	81.3	3
*	- from QEW west on Regional Rd. 47 (Lyons Creek Rd./Bigger Rd.) to PI-27E	0.0	N.A.	N.A.	N.A.	1.0	0	10.4	8.0	1
	- from 406 (proposed) east on Regional Rd. 27; north on Regional Rd. 84 (Moyer Rd.); west on Bigger Rd. (Regional Rd. 47) to PI-27E	0.0	N.A.	N.A.	N.A.	9.5	6	22.7	81.3	2

Based on the data in Table 4-7 the alternate routings for each siting alternative were compared and ranked. The rankings, as shown (1 is best and 3 is poorest), are relative to each siting option. There was no attempt in this table to compare access routes among siting options.

The rationale applied in assigning the relative suitability rankings is outlined in Table 4-8. Here the reasons for differentiating routes with a rank of 1 from those ranked 2 are summarized. Generally, short routes which avoided local access roads are preferred. This minimizes the risk of damage to agricultural activities due to accidental spills en route and the impact to prime farmland and buildings if local access roads are to be upgraded and possibly widened.

For regional roads the preference is to pick those with the lowest values for all factors. Where this was not possible, preference was given to those which exhibit both low numbers of farm complexes and low values for sensitive crops.

Where the available data did not clearly suggest a separation between any two routes being compared, the routes were given an equal ranking. Therefore, in some cases, more than one route has been assigned a ranking of 1.

When the comparison of routing alternatives was completed, based on data from each of the consultants, a set of preferred access routes

TABLE 4-8

RATIONALE FOR RANKING OF ACCESS ROADS

Access Roads		Principal Reasons for Selection of Top Ranked Access Roads*
To LF-4N	-	shortest routes
	-	few or no farm complexes on local roads
	-	few farm complexes on regional roads
	-	relatively low sensitive crop values
To LF-2N	-	no farm complexes on regional road
LF-2N - PI-1A1	-	few farm complexes on regional road
	-	lower sensitive crop value
LF-2N-PI-13N	-	avoids sensitive specialty crops on Trafalgar Road
	-	fewest farm complexes on local and regional roads
LF-2N-PI-1N	-	short route
	-	no farm complexes on local access roads and few on regional roads
	-	lower sensitive crop value
To PI-13N	-	short routes
	-	fewest farm complexes on regional roads
	-	local access is James Snow Parkway extension
	-	lowest livestock and sensitive crop values
To PI-1A1	-	fewest farm complexes
	-	lower sensitive crop value
To LF-10W	-	no alternative routes
LF-10W-PI-2W	-	no alternative routes
To LF-11W	-	no alternative routes
LF-11W-PI-2W	-	no alternative routes
To LF-2W	-	no alternative routes
To LF-1C	-	shortest route

*Refer to Table 4-7.

Access Roads		Principal Reasons for Selection of Top Ranked Access Roads
LF-1C-PI-18E	-	no alternative route
To LF-3C	-	no local road
	-	a short regional road
	-	mid-range for number of farm complexes
	-	low livestock and sensitive crop values
To LF-8C	-	lowest sensitive crop value
	-	mid-range for number of farm complexes on regional roads
To LF-9C	-	shorter routes
	-	low number of farm complexes on regional roads
	-	low livestock populations
	-	low and moderately high sensitive crop values
To LF-1E	-	shortest route
	-	no farm complexes on regional road but 3 on local
	-	lowest sensitive crop value but highest for livestock
To LF-3E	-	shortest route
	-	no farm complexes
	-	lowest sensitive crop and livestock values
To PI-27E	-	shortest route
	-	no farm complexes
	-	lowest sensitive crop and livestock values

emerged. These routes are designated by an asterisk in Table 4-7. Subsequently, the data for each of these routes was considered with the site and site vicinity data in the identification of candidate sites.

RANKING OF FACTORS AND FACTOR GROUPINGS

For the purpose of applying the agricultural data in the narrowing down of potential sites it was necessary to rank the data within each factor and, to the extent possible, to rank the factors and factor groupings.

Consistent with the treatment of most other factors in the Initial Comparative Evaluation, the factors were ranked in four constraint levels: low (or positive), moderately low, moderate, and high. In the case of sensitive crops and livestock density, a fifth level (very high) was added to maintain consistency within the other factors in the air dispersion/quality assessment. Also, for access roads only three constraint levels were utilized.

In most cases, the factors demonstrate a range of values across the potential siting options. The subdivision of these ranges into four or five levels was accomplished by inspection of the general frequency distribution of values.

For factors such as designated land use, land use categories were assigned to constraint levels based on the degree of compatibility or

incompatibility between the designation and the proposed treatment/ disposal facilities. In this case a designation such as industrial or heavy industrial was considered positive from the viewpoint of agriculture.

Table 4-9 presents the scoring ranges and methods of deriving these for each of the relevant factors. Only one site factor, area of cultivated land, was not carried into the factor ranking phase. It was dropped because of minimal differences among sites and because of the annual shifts that occur in the amount of cultivated land, especially in urban shadow areas.

Application of the ranking criteria in Table 4-10 to the raw data in Tables 4-5, 4-6 and 4-7 resulted in the factor rankings shown in Table 4-10 for each of the siting options and related local and regional access road systems.

Consideration was then given to ranking of factors and factor groupings. In terms of the groupings, site and site vicinity factor groupings were considered approximately equal. The site grouping includes the one time, but irreversible, losses of agricultural land and existing farm enterprises. The site vicinity grouping includes those farm enterprises in the surroundings of a site which may experience the effects on both a short- and a long-term basis. Generally access roads were considered of lesser significance due to the relatively smaller area that may be affected.

TABLE 4-9

RANKING OF AGRICULTURAL FACTORS

SITE FACTORS

1.0 Farm Building Complexes

A) Score: (# above average x 2) + (# average x 1) = score

B) Constraint levels:

	Score Ranges
Low	0 - 1
Moderately low	2 - 3
Moderate	4 - 5
High	> 5

2.0 Land Fragmentation

A) Score: (# holdings <20 ha) + (# non-farmhouses) = score

B) Constraint levels:

	Score Ranges
Low	> 15
Moderately low	10 - 15
Moderate	5 - 9
High	< 5

3.0 Class 1 Equivalents

A) Score: Class 1 equivalent ha as percent of site size (ha)

B) Constraint levels:

	Score Ranges (%)
Low	< 45
Moderately low	45 - 65
Moderate	66 - 85
High	> 85

4.0 Land Use Designation

A) Constraint levels:

Low	Heavy industrial and Industrial
Moderately low	Special Policy Area
High	Agriculture, Good general agriculture, Rural agriculture 1 and 2, Rural

5.0 Public Land Ownership

A) Score: percent of site area publicly owned

B) Constraint levels:

	Score Ranges (%)
Low	> 40 Public
Moderately low	20 - 40
Moderate	1 - 19
High	All Private

SITE VICINITY FACTORS

6.0 Farm Building Complexes

A) Score: (# above average x 2) + (# average x 1) = score

B) Constraint levels:

	Score Ranges
Low	0 - 3
Moderately low	4 - 7
Moderate	8 - 11
High	> 11

7.0 Sensitive Crop and Livestock Density

A) Score: sensitive crop index + livestock density index = score

Indices	Sensitive Crops ($000's)	Livestock Density (#/40 ha)
1	< 130	< 1000
2	130 - 170	1000 - 2000
3	> 170	> 2000

B) Constraint levels:

	Score Ranges
Low	2
Moderately low	3
Moderate	4
High	5
Very High	6

8.0 Soil Capability (1 km radius)

A) Score: Predominant soil capability class level

B) Constraint levels:

	Score Ranges
Low	Class 3, 3>4 or 4
Moderately low	Class 2 = 3 or 3>2
Moderate	Class 2
High	Class 1

9.0 Predominant Land Use Designation (1 km radius)

A) Constraint levels:

Low	Heavy industrial and Industrial
Moderately low	Special Policy Area
High	Agriculture, Good general agriculture, Rural agriculture 1 and 2, Rural

ACCESS ROAD FACTORS

10.0 Local Access Roads

Constraint Levels	Factors	Score Ranges
Low	Active farm complexes (#)	0
	Livestock population (#)	< 1000
	Class 1 equivalent (km)	< 1
Moderate	Active farm complexes (#)	1 - 3
	Livestock population (#)	1000 - 10 000
	Class 1 equivalent (km)	1 - 2
High	Active farm complexes (#)	> 3
	Livestock population (#)	> 10 000
	Class 1 equivalent (km)	> 2

Regional Access Roads

Low	Active farm complexes (#)	< 10
	Livestock population (#)	< 100 000
	Sensitive crops ($000's)	< 100 000
Moderate	Active farm complexes (#)	10 - 30
	Livestock population (#)	100 000-300 000
	Sensitive crops ($000's)	100 000-500 000
High	Active farm complexes (#)	> 30
	Livestock population (#)	> 300 000
	Sensitive crops ($000's)	> 500 000

TABLE 4-10

AGRICULTURAL RATING OF SITING OPTIONS

	SITE					VICINITY				LOCAL ACCESS ROADS			REGIONAL ACCESS ROADS		
Siting Option	Farm Buildings	Land Fragmentation	Class 1 Equiv.	Land Use Design	Public Ownership	Farm Buildings	Sensitive Receptors	Soil Cap.	Land Use Design	Active Farms	Livestock Pop.	Soil Cap.	Active Farms	Livestock Pop.	Sens. Crops
LF-1E	ML	L	M	H	H	ML	ML	M	H	M	H	M	L	L	L
LF-3E	L	L	ML	H	H	ML	ML	L	H	-	-	-	L	L	L
LF-8C	H	M	M	H	H	H	VH	M	H	H	H	M	M	M	H
LF-9C	ML	H	M	H	H	H	H	M	H	-	-	-	M	H	H
LF-3C	ML	M	M	H	H	H	H	ML	H	H	H	H	H	H	H
LF-10W	M	M	ML	H	H	M	ML	L	H	M	L	L	M	L	M
LF-11W	L	ML	M	H	H	H	M	L	H	-	-	-	M	L	M
LF-4N	L	M	H	H	H	ML	ML	H	H	H	L	H	L	L	M
LF-1C/PI-18E	M	L	ML	ML	ML	M	L	L	ML	L	M	L	M	L	L
LF-10W/PI-2W	M	M	ML	ML	M	H	M	L	ML	M	M	L	M	L	M
LF-11W/PI-2W	M	L	ML	ML	M	H	M	L	ML	L	M	L	M	L	M
LF-4N/PI-1N	L	L	H	H	H	H	L	H	H	-	-	-	L	L	L
LF-2N/PI-1A1	L	ML	H	L	M	ML	L	H	L	-	-	-	L	L	M
LF-2N/PI-1N	L	L	H	ML	M	H	L	H	ML	H	L	H	M	L	L
LF-1E/PI-27E	ML	L	M	ML	M	M	ML	M	ML	M	H	M	L	L	L
LF-4N/PI-13N	M	M	H	H	L	H	ML	H	H	L	L	L	M	L	L
LF-2N/PI-13N	M	M	H	ML	L	M	ML	H	ML	H	L	H	L	L	L

NOTE: L = Low constraint
ML = Moderately low constraint
M = Moderate constraint
H = High constraint
VH = Very high constraint

Within each factor grouping each factor was given an equal weighting. No generally accepted standards are available for variable weighting of such factors. Also, the public involvement to-date has not been specific enough to suggest a different weighting scheme.

APPLICATION OF FACTOR RANKING

The final step in the initial comparative evaluation process was to place each of the siting options into one of four levels. In doing so, it was necessary to take into account the ratings for each factor in the site, site vicinity, local and regional access road settings.

The placement of each siting option in one of the four levels--from most suitable to least suitable--was accomplished in three stages. First, the site and site vicinity factors were scored in order to place the siting options in an initial relative order. Secondly, cut-offs between siting options were selected so that four initial suitability groupings resulted. Third, adjustments to the groupings were made based on the access road factor constraint levels.

The preliminary scoring of sites was accomplished by assigning the following values to the site and site vicinity constraint levels for each of the factors:

Very High	5
High	4
Moderate	3
Moderate to Low	2
Low	1

Once the above values were assigned to the ratings in Table 4-10, a sum was taken of the values for all relevant factors for each siting option. Resulting from this procedure was the following grouping of siting options:

Initial Ranking Based on Site and Site Vicinity Factors

Level 1 (most suitable)	- LF-1C/PI-18E; LF-2N/PI-1A1;[1]
Level 2	- LF-1E; LF-3E; LF-10W/PI-2W; LF-11W/PI-2W; LF-2N/PI-1N; LF-1E/PI-27E; LF-2N/PI-13N;
Level 3	- LF-3C; LF-10W; LF-11W; LF-4N; LF-4N/PI-1N; LF-4N/PI-13N
Level 4 (least suitable)	- LF-8C; LF-9C;

The above ranking was then reassessed based on the constraints for local and regional access roads shown in Table 4-10 and on relevant data from Tables 4-5 and 4-6. The following composite ranking was thus derived:

Composite Ranking of Siting Options

Level 1 (most suitable)	- LF-3E; LF-1C/PI-18E; LF-2N/PI-1A1; LF-1E/PI-27E;
Level 2	- LF-1E; LF-10W/PI-2W; LF-11W/PI-2W; LF-2N/PI-1N; LF-2N/PI-13N;
Level 3	- LF-10W; LF-11W; LF-4N; LF-4N/PI-1N; LF-4N/PI-13N.
Level 4 (least suitable)	- LF-3C; LF-8C; LF-9C;

[1] Siting options are listed in the order in which they appear in Tables 4-5 and 4-6. The order within levels does not imply relative suitability within each group of siting options.

The reasons for moving two of the siting options from one level to another are summarized below:

LF-3C
- moved from Level 3 to Level 4
- has highest access road constraints of all options

LF-1E/PI-27E
- moved from Level 2 to Level 1
- more favourable than LF-1E since no toxic wastes are hauled to the LF-1E site and has lower sensitive crop value
- score is more favourable than for all other options in Level 2

LF-3E
- moved from Level 2 to Level 1
- more favourable than LF-1E since no local access road and short haul from the QEW
- intrudes less into the rural area than LF-1E
- like LF-1E/PI-27E, score is more favourable than for all other options in Level 2

Because of the level of detail of data that was obtainable at this stage in the site selection process, it is considered that ranking of siting options can be advanced only to the point of four groupings or levels of sites. The data are not sufficiently detailed to support a ranking of siting options within the four suitability levels.

In a qualitative sense, several differences among siting options are evident. First, it is clear that option LF-2N/PI-1A1 is by far the best for siting from an agricultural viewpoint. The industrial and proposed industrial designations and the near-urban setting mean that the existing agricultural activity on-site has little future. As well, the low sensitive crop and livestock population and the low impact rating of the access routes is very favourable. Most of the preferred route is through non-agricultural land uses.

Sites LF-1C/PI-18E and LF-1E/PI-27E also have the desirable characteristics of some industrially designated lands for the physical-chemical treatment/incinerator components and marginally valuable rural lands for the landfill. In both cases, soil capability values are relatively low, there are relatively few commercial farm operations on site or in the immediate vicinity and land fragmentation is relatively high.

Sites LF-8C, LF-3C and LF-9C, as integrated sites, rank at the bottom of the scale. The three sites are ranked lowest because by comparison with the other options, they are surrounded by more average and above average farms, have the highest sensitive crop and livestock values in the 5 km radii of the sites, and have the poorest access road ratings. LF-8C is considered the least desirable of the three because it has the highest rating for both sensitive receptors and farm buildings.

The agricultural character of the above area is evidenced by a combination of additional facts: a higher percentage of site area lands are cultivated, there are above-average farm complexes on-site (LF-8C) and in the site vicinity (all three), land fragmentation is relatively low. A physical-chemical treatment plant and incinerator in such an area would, relative to the alternatives, be most incompatible with the surrounding agricultural activity.

CONCLUSIONS

The results of the foregoing analyses indicate that significant differences exist among several of the potential sites from an agricultural perspective. The optimum siting combination from an agricultural perspective is LF-2N/PI-1A1 where the land base, despite its current agricultural use and its Class 1 soils, is designated and proposed industrial and is situated with urban shadow areas. Also, the potential access road impacts are significantly lower for this than for any other alternative. Closely rated in suitability from an agricultural perspective are siting options LF-1E/PI-27E and LF-1C/PI-18E.

Those siting options which could potentially have the greatest impacts on agriculture are LF-8C, LF-9C and LF-3C. They contain arable land (Classes 2, 3 and 4), are actively used for agriculture, have the highest impact potential along regional access roads and are situated in areas that are dominated by agricultural uses with relatively few non-farm influences. Sensitive crops and livestock values in the 5 km radii of the sites are very high. Of the three options LF-8C is considered the least desirable for siting OWMC facilities.

The remaining siting options have been ranked in one of two intermediate levels. However, it was not possible to rank the options within each level. Until data can be collected from farm operators and the

land ownership and leasing situation determined, further ranking of the remaining sites cannot be justified on agricultural factors alone. The required data for completing the comparison will be obtained during the Detailed Comparative Evaluation during Phase 4A.

It is recommended that at that time the quality of soils within the potential sites be checked. From the agricultural climate viewpoint there should be an assessment of the differences among the potential sites relative to their influence on crop yield potential of the soils.

Also, data on the types of crops and livestock populations within the zones of influence of incinerator sites and along access roads should be obtained from field surveys to supplement the existing data from the 1981 Census of Agriculture.

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APPENDIX A

EXCERPTS FROM THE FOODLAND GUIDELINES[1]

3.10 The rating described above represents a first stage. A second stage may be needed in allocating lands for different purposes, as described in the following section under Evaluation of Alternative Uses. The second stage would provide for priority rating within a single class of agricultural land, and would be based on factors other than capability, such as existing areas of viable farming, special markets, continuous blocks of agricultural land, or concentrations of capital investment in facilities such as stone removal, drainage systems, irrigation systems, dyking, fertility improvements, etc. If agricultural lands must be allocated to other uses, areas with such improvements should be given higher priority for protection than lands of the same capability which do not have such improvements.

3.11 Alternately, circumstances may exist that decrease the value of the agricultural resource compared to other lands of the same capability. For example, if an area has a wide range of existing uses such as rural residential development or small-scale commercial and industrial activities scattered among farms, this may create conflicts. An area may also be fragmented into parcels too small to be of value to agriculture.

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[1] Government of Ontario, Foodland Guidelines, A Policy Statement of the Government of Ontario on Planning for Agriculture, 1978, (p. 12-13).

Areas with such features might be given lower priority for protection than other lands of the same capability without such characteristics.

3.13 Where high capability agricultural lands have been identified, the use of these lands for productive agricultural purposes must be given priority in evaluating alternative uses. If the land is to be used for another purpose, the requirement must be justified. The need for the alternate use within the municipality or planning area must be documented, as must the reasons why lower capability or marginal land cannot be used.

3.14 Documentation of need for the land use must cover each of four basic issues: the necessity for the land use, the amount of land needed, the reasons for the choice of location, and the consideration given to alternate locations on lower capability land. The details will vary depending on the proposed use (residential, industrial, commercial, institutional, etc.) but will include the relevant criteria in the following list:

1. Necessity for the land use would be based on the following considerations:

   - projected population for the planning area
   - projection from past rates of industrial or commercial space within the community or planning area
   - demand for industrial or commercial space within the community or planning area
   - amount of growth allocated by broader studies such as county, regional or provincial studies
   - analysis of jobs required within the planning area to provide a suitable population-to-job ratio

2. Land area needed would be based on the following considerations:

   - amount of existing vacant developable land already designated or proposed for this purpose

   - potential for infilling existing areas

   - land acreage required, calculated on the basis of population increase to be accommodated at reasonable density for the community under consideration

   - project from previous rates of land consumption, where such a projection is justified

   - new information which may demonstrate the need for a land consumption rate higher than past trends

   - possible need for over-designation to allow for competition in the marketplace

   - efficiency of servicing

3. Reasons for the choice of location based on the following considerations:

   - site which comprises the lowest capability farmland of the potential sites

   - no poor agricultural land which could be used

   - infilling between existing non-agricultural development

   - logical extension of an existing community

   - prior servicing commitments

   - special use that requires special locational requirements

4. Consideration given to alternate locations of lower capability agricultural lands. The documentation should indicate whether alternative locations on poorer agricultural lands are available and, if they exist, the reasons why these locations were considered unsuitable.

APPENDIX B

GROUPS AND INDIVIDUALS CONSULTED

1. Representatives of Provincial Agricultural Organizations who participated in meetings about the Agricultural Methodology in OWMC's Site Selection Process.

- Ontario Federation of Agriculture
  - Mr. L. Girty
  - Mr. H.C. Schwegler
  - Mr. R. Walker (alternate)

- Soils and Crop Improvement Association
  - Mr. D. Wagner
  - Mr. G. Richardson

- Christian Farmers Federation of Ontario
  - Mr. E. Van Donkersgoed

- Ontario Institute of Agrologists
  - Mr. D. McArthur
  - Mr. J. Hagarty

- National Farmers Union
  - invited but did not send a representative; minutes of meetings were sent to Mr. D. Beaver

2. Representatives of the Ontario Ministry of Agriculture and Food consulted.

- Foodland Preservation Branch
  - Mr. D. Dunn - Director
  - Ms. D. Sharpe - District Manager, Southwestern Ontario
  - Mr. N. Smith - District Manager, Central and Northern Ontario

- Niagara North
  - Mr. C. Holden - Agricultural Representative
  - Mr. G. Mitchell - Assistant Agricultural Representative
  - Mr. B. Wilcox - Horticultural Crop Advisor

- Niagara South
  - Mr. R. Stork - Agricultural Representative

- Haldimand
  - Mr. H. Bentley - Agricultural Representative
  - Mr. D. Hilborn - Drainage Engineer

- Brant and Hamilton-Wentworth
  - Mr. D. Keys - Agricultural Representative, Wentworth County
  - Mr. H. Fraser - Agricultural Engineer, Brant and Wentworth Counties
  - Mr. B. Lang - Farm Management Specialist, Brant and Hamilton Counties
  - Mr. R. Valaitis - Land Use Specialist, Foodland Preservation Branch, Hamilton-Wentworth, Haldimand-Norfolk and Niagara

- Halton-Peel
  - Mr. B. Bell - Agricultural Representative, Peel
  - Mr. H. Stanley - Agricultural Representative, Halton
  - Mr. D. Miller - R.D.S. (Agriculture)
  - Mr. H. Flaming - Land Use Specialist, Fergus

A general presentation was made to the following OMAF staff.

- Mr. D. Heard - Regional Manager, Agricultural Representatives Branch
- Mr. W. Gagman - R.O.S. (Agr.), Brantford
- Ms. N. Morphet - R.O.S (H.E.), Ancaster
- Ms. R. Marcou - R.O.S., London
- Ms. C. Murphy - R.O.S., Niagara
- Mr. B. Lans - A.R.B., Ancaster
- Mr. D. Hilborn - Engineering, Cayuga
- Mr. H. Bentley - A.R.B., Cayuga
- Mr. J. Underwood - Engineering, Ridgetown
- Mr. H. Fraser - Engineering, Brantford
- Mr. D. Graham - Ag. Rep., Brantford
- Mr. D. Keys - Ag. Rep., Ancaster
- Mr. K. Bereza - P.I.B., Ancaster
- Mr. R. Macartney - A.I.B., Guelph
- Ms. D. Peer - A.I.B., Guelph
- Ms. R. Winslade - A.R.B., Vineland
- Mr. R. Stork - A.R.B., Welland
- Mr. R. Richards - A.R.B., Norfolk
- Mr. C. Holden - Ag. Rep., Vineland Station
- Mr. G. Mitchell - A.R.B., Niagara
- Ms. K. Whale - A.R.B., Haldimand-Norfolk; R.O.S., Norfolk
- Ms. C. Kellam - R.O.S., Niagara
- Mr. P. Fleming - R.O.S., Guelph
- Mr. K. Clark - R.C.A.T., Vineland Station
- Mr. H. Wright - P.I.B., Guelph

APPENDIX C

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APPENDIX D

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
AGRICULTURE	Soil Capability for Agriculture

FACILITY COMPONENTS AFFECTED: ALL

DEFINITION OF FACTOR:

The potential of the land base for growth of common field crops.

RATIONALE/SIGNIFICANCE:

Mapping of the candidate areas on the basis of land capability for field crops will provide a basis for evaluating the physical loss of the agricultural land base and potential agricultural outputs during site identification.

Preservation of highly productive agricultural soils is a goal of the Foodland Guidelines of the Ministry of Agriculture and Food, and is a stated objective of several farm organizations and municipalities. Loss of higher capability land has a greater impact on long-term agricultural productivity than does land of lower capability.

SOURCES OF INFORMATION:

1. Canada Land Inventory (CLI) maps, 1:50,000 scale for: 30 L/14, 30 L/15, 30 M/3, 30 M/12.
2. Soil maps from the Ontario Institute of Pedology (OIP) for:
   - Region of Haldimand-Norfolk (1982), Town of Grimsby and West Lincoln (1982), Region of Halton (1970), Region of Hamilton-Wentworth (1965), Brant County (in progress)
3. Organic soil capability maps (ARDA), 1:50,000 scale for: 30 L/14, 30 L/15.

INTERPRETATION/METHODOLOGY:

In areas covered by the CLI maps noted above, the CLI information is the most recent and detailed available on the capability of mineral soils for common field crops. This information at a scale of 1:50,000 will be transferred directly to the candidate area base maps. Since the maps have numerous complex map units, i.e., they consist of more than one capability class in a map unit, it is necessary to apply a procedure which results in one capability class rating per map unit. This procedure is based on productivity indicies developed by Hoffman (1971) and has been accepted by the OIP.

In cooperation with the OIP, CLI soil capability ratings for common field crops will be determined for soil types shown on the relevant portions of soil maps noted above. The same procedure noted above is applied to complex soil map units to give single capability ratings.

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR: Soil Capability for Agriculture

CRITERIA/INDICATORS:

- CLI ratings will indicate the capability of mineral soils for common field crops.
- This seven class system ranks relative potential; Class 1 is the highest and Class 7 lowest. Organic soils are not evaluated in this system.

  The ARDA 7 class capability system will be used to rank organic soils for relative potential to produce vegetable crops.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

- Soil maps avialble at different scale will be converted to the common base map scale of 1:50,000. Available scales are as follows:
  - 1:25,000 - Haldimand-Norfolk
    - Towns of Grimsby and West Lincoln
    - West Lincoln Township
    - Brant County
  - 1:63,360 - Region of Hamilton-Wentworth
    - Region of Halton

. The CLI system for mineral soils evaluates and ranks soils only for common field crops. The organic capability maps evaluate and ranks organic soils for vegetable crops.

. The organic soil capability map sheets identified are those within the study area which contain mapped organic soils. The mapping project identified only those organic soil areas larger than 50 acres.

. The less detailed capability information on the CLI map sheets will be upgraded during the site screening stage for any candidate sites that fall within these areas.

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
Agriculture	Agricultural Cropping Systems

FACILITY COMPONENTS AFFECTED: ALL

DEFINITION OF FACTOR:

A description of the current level of cropping activity in the candidate area based on mapping of agricultural cropping systems.

RATIONALE/SIGNIFICANCE:

Agricultural cropping system maps will indicate the type and level of utilization of the land resource for the production of crops. Different combinations of crops, known as rotations or cropping systems, are generally indicative of associated livestock rearing and of the level of intensity or inputs to agriculture being employed in the candidate area.

The removal of land in high intensity cropping systems would generally result in a higher level of impact on existing farm enterprises than the loss of land in low intensity systems.

SOURCES OF INFORMATION:

Agricultural Land Use Systems maps prepared by:

1. Land Resource Research Institute of Agriculture Canada, 1:25,000 (manuscript form):
   - Region of Haldimand-Norfolk (1982)
   - Region of Niagara (1981)
2. Ontario Ministry of Agriculture and Food, 1:50,000: (see second sheet)

INTERPRETATION/METHODOLOGY:

All land use system maps will be converted to 1:50,000 scale. Cropping systems as displayed on the maps will be slightly generalized and grouped according to their relative levels of agricultural intensity based on the Huffman and Dumanski (1983) system.

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
Agriculture	Agricultural Cropping Systems

CRITERIA/INDICATORS:

- Agricultural Land Use Systems Maps classify and map rotational field crop systems, specialty crops, non-agricultural land use types and buildings.
- See definitions of individual cropping systems in Appendix G.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

The ranking of cropping systems used preparing the map for this factor is as follows:

1. specialty crops
2. row crops or corn-wheat
3. mixed
4. cereal grain or hay-grain or hay (good quality)
5. hay (poor quality) or pasture, or grazing
6. non-agricultural land use .

The above ranking orders the crop rotation systems from the highest levels of management inputs to the lowest. In general this ranking also reflects the relative levels of output realized by the farm enterprises associated with these crop rotation systems.

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
Agriculture	Agricultural Cropping Systems

FACILITY COMPONENTS AFFECTED: ALL

DEFINITION OF FACTOR:

RATIONALE/SIGNIFICANCE:

SOURCES OF INFORMATION:
- Town of Caledon, City of Brampton (Peel County), 1983
- Town of Milton (Halton County), 1983
- City of Burlington (Halton County), 1983
- City of Mississauga (Peel County), 1983
- Brantford Township (Brant County), 1983
- Town of Stoney Creek (Hamilton-Wentworth), 1983
- Onondaga Township (Brant County), 1982
- Ancaster Township (Hamilton-Wentworth), 1982
- Glanbrook Township (Hamilton-Wentworth), 1982

INTERPRETATION/METHODOLOGY:

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
Agriculture	Urban Shadow

FACILITY COMPONENTS AFFECTED: All

DEFINITION OF FACTOR:

Those locations in agricultural areas where the pressures of urban-related uses have altered the agricultural land base, infrastructure and/or community sufficiently to de-stabilize the agricultural sector and place its long-term future in doubt.

RATIONALE/SIGNIFICANCE:

The impacts of an OWMC facility siting to the agricultural sector will be lower on lands undergoing urban related change than on lands which have been relatively free of such destabilizing pressures as land speculation, rural non-farm residences and severences.

A higher priority should be given to these areas for candidate sites than more stable rural agricultural areas, regardless of the soil capability and existing agricultural use.

SOURCES OF INFORMATION:

A background study by Ecologistics Limited entitled 'SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Urbanization'. The main information sources utilized in the study are:

1. 1981 Census data at the Enumeration Area (E.A.) level.
2. A literature review.
3. Consultation with recognzied experts in the field of urbanization in Ontario.

INTERPRETATION/METHODOLOGY:

In order to identify urban shadow areas, the study approach is to select and measure key variables as indicators of urban pressure. The methodology for data analysis is based on the review of literature, and consultation with recognized experts.

The 1981 Census of Agriculture and Population Census at the E.A. level are utilized as they provide the lowest level of data aggregation with comprehensive coverage for all Candidate Areas.

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
Agriculture	Urban Shadow

CRITERIA/INDICATORS:

The selected indicators of urban pressure are:

- the percent of E.A. improved farmland rented
- the percent of E.A. not farmed
- the percent of rural non-farm population

The analysis ranked groupings of high, medium and low cut-off values for each indicator. An E.A. with high categories for all 3 indicators was designated an urban shadow area.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

Since minimal empirical work has been undertaken to measure the impact of urbanization on agricultural resources, the method of analysis was devised specifically for this study.

The E.A.'s identified as urban shadow are those most affected by urban pressure within the OWMC Candidate Areas.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
Agriculture	Designated Industrial and Residual Urban Lands

FACILITY COMPONENTS AFFECTED: All

DEFINITION OF FACTOR: Undeveloped industrial land use designations in Municipal and Regional Official Plans and Residual Urban land designations in Regional Official Plans. The latter are undeveloped lands within the urban or hamlet development envelopes defined in Regional Official Plans but not designated for urban uses in area municipality Official Plans.

RATIONALE/SIGNIFICANCE:

Impacts to agriculture from industrial-type uses usch as OWMC waste treatment facilities will be lowest on lands already designated for industrial uses.

Those candidate sites on designated industrial and residual urban lands will be considered appropriate for potential sites, regardless of the soil capability class and present agricultural use.

SOURCES OF INFORMATION:

From Municipal and Regional Official Plans.
Provided by Marshall, Macklin, Monaghan Limited.

INTERPRETATION/METHODOLOGY:

Lands designated for industrial and residual urban uses have officially been approved for conversion to non-agricultural uses.

The location of each candidate site area will be checked for the land use designation.

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
Agriculture	Designated Industrial and Residual Urban Lands

CRITERIA/INDICATORS:

Industrial and residual urban land uses as defined in Municipal and Regional Official Plans. Proposed industrial designations which have not been finalized in Official Plans will be considered as designated industrial lands.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

Although these lands designated for industrial and residual urban uses may presently be in agricultural production, they will be converted to industrial land uses in the future.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
Agriculture	Public Ownership

FACILITY COMPONENTS AFFECTED: All

DEFINITION OF FACTOR: Those lands owned and held by federal, provincial or municipal agencies for future uses which benefit the public at large.

RATIONALE/SIGNIFICANCE:

Lands in public ownership are intended for uses which benefit the public at large. Use of these lands would minimize the impacts upon private landowners.

These are considered potentially suitable for siting O.W.M.C. facilities from the agricultural viewpoint, regardless of their soil capability and current use status.

SOURCES OF INFORMATION:

Mapping prepared by Marshall, Macklin, Monaghan Limited.

INTERPRETATION/METHODOLOGY:

The location of publicly owned land will be checked with each candidate site area. Those lands which are surplus or are being held for a future use and are presently idle or leased for agriculture will be considered very good for siting O.W.M.C. facilities.

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
Agriculture	Public Ownership

CRITERIA/INDICATORS:

Lands owned by federal, provincial, or municipal agencies which can be made available for use for O.W.M.C. facilities.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

Although these lands may presently be used for agriculture under leasing arrangements, their intended uses are for non-agricultural uses.

APPENDIX E

SUMMARY OF THE SOIL CAPABILITY CLASSIFICATION FOR AGRICULTURE

In this classification, on the basis of soil survey information, mineral soils are grouped into seven classes. Soils in Classes 1, 2, 3 and 4 are considered capable of sustained use for cultivated field crops; those in Classes 5 and 6 only for perennial forage crops; and those in Class 7 for neither.

Important criteria on which the classification system is based are:

- Soils will be well managed and cropped, using a largely mechanized system.
- Land requiring improvements (including clearing) that can be made economically by the owner is classed according to its limitations or hazards in use as if the improvements have been made. Land requiring improvements deemed beyond the means of the individual owner is classed according to its present condition.
- These factors are not considered: distances to market, type of roads, location, size of farms, type of ownership, cultural patterns, skill or resources of individual operators and hazard of crop damage by storms.

The classification does not include capability of soils for trees, tree fruits, small fruits, ornamental plants, recreation or wildlife.

The classes are based on intensity rather than the type of agricultural limitations they display. Each class includes many kinds of soils and many of the soils in a class need different management and treatment.

CLASSES

1. SOILS IN THIS CLASS HAVE NO SIGNIFICANT LIMITATIONS IN USE FOR CROPS. The soils are deep, are well to imperfectly drained, hold moisture well and, in the virgin state, were well supplied with plant nutrients. They can be managed and cropped without difficulty. Under good management, they are moderately high to high in productivity for a wide range of field crops.

2. SOILS IN THIS CLASS HAVE MODERATELY SEVERE LIMITATIONS THAT RESTRICT THE RANGE OF CROPS OR REQUIRE SPECIAL CONSERVATION PRACTICES. The soils are deep and hold moisture well. The limitations are moderate and the soils can be managed and cropped with little difficulty. Under good management, they are moderately high to high in productivity for a fairly wide range of crops.

3. SOILS IN THIS CLASS HAVE MODERATELY SEVERE LIMITATIONS THAT RESTRICT THE RANGE OF CROPS OR REQUIRE SPECIAL CONSERVATION PRACTICES. The limitations are more severe than for Class 2 soils. They affect one or more of the following practices: timing and ease of tillage, planting and harvesting, choice of crops and methods of conservation. Under good management, they are fair to moderately high in productivity for a fair range of crops.

4. SOILS IN THIS CLASS HAVE SEVERE LIMITATIONS THAT RESTRICT THE RANGE OF CROPS OR REQUIRE SPECIAL CONSERVATION PRACTICES, OR BOTH. The limitations seriously affect one or more of the following practices: timing and ease of tillage, planting and harvesting, choice of crops and methods of conservation. The soils are low to fair in productivity for a fair range of crops, but they may have high productivity for a specially adapted crop.

5. SOILS IN THIS CLASS HAVE VERY SEVERE LIMITATIONS THAT RESTRICT THEIR CAPABILITY TO PRODUCING PERENNIAL FORAGE CROPS AND IMPROVEMENT PRACTICES ARE FEASIBLE. The limitations are so severe that the soils are not capable of use for sustained production of annual field crops. The soils are capable of producing native or tame species of perennial forage plants and may be improved by use of farm machinery. The improvement practices may include clearing of bush, cultivation, seeding, fertilizing or water control.

6. SOILS IN THIS CLASS ARE CAPABLE ONLY OF PRODUCING PERENNIAL FORAGE CROPS AND IMPROVEMENT PRACTICES ARE NOT FEASIBLE. The soils provide some sustained grazing for farm animals but the limitations are so severe that improvement by use of farm machinery is impractical. The terrain may be unsuitable for use of farm machinery, the soils may not respond to improvement or the grazing season may be very short.

7. SOILS IN THIS CLASS HAVE NO CAPABILITY FOR ARABLE CULTURE OR PERMANENT PASTURE. This class also includes rockland, other non-soil areas and bodies of water too small to show on the maps.

0. ORGANIC SOILS (Not placed in capability classes.)

Source: Environment Canada Lands Directorate, The Canada Land Inventory Objectives, Scope and Organization, Report No. 1, 1978.

APPENDIX F

THE PROCEDURE FOR CONVERTING COMPLEX SOIL CAPABILITY MAP UNITS TO SIMPLE SOIL CAPABILITY MAP UNITS

Sample Calculation: $\frac{055^{6}}{c} + \frac{066^{4}}{b}$ [1]

STEP 1 . determine capability class proportions
- . soil map unit 055 with slope "c" is Class 2
- . soil map unit 066 with slope "b" is Class 3
- . therefore, complex represents 60% Class 2 and 40% Class 3

STEP 2 . determine total capability index level from the table below:

Soil Capability Indices for Common Field Crops[2]

Soil Capability Class	Index Level
Class 1	1.00
Class 2	0.80
Class 3	0.64
Class 4	0.49
Class 5,6	0.32[3]
Organic Soils	0.0

- . Class 2 has an index level of .80 and Class 3 has an index level of .64.
- . capability index is: 60% x .80 = 48.0
  40% x .64 = 25.6
  73.6

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[1] Map unit designation: $\frac{\text{soil map unit}}{\text{slope class}}$ proportion within complex.

[2] Environment Canada, The Assessment of Soil Productivity for Agriculture, ARDA Report No. 4 (CLI Program), November 1971, 57 p.

[3] Extrapolated from the Hoffman indices.

STEP 3 . determine single capability class from table below:

Index Range	Capability Class
100 - 90	1
89 - 72	2
1 - 57	3
56 - 44	4
44 - 01	5

. therefore, complex map unit $\frac{055^{6}}{c} + \frac{066^{4}}{b}$ has a Class 2 capability for agriculture

APPENDIX G

AGRICULTURAL LAND USE SYSTEMS
ONTARIO MINISTRY OF AGRICULTURE AND FOOD

FIELD CROPS

Continuous Row Crop	Single intensive crop type, i.e., corn or beans. Also includes any combination of corn, white beans, soybeans or other variety of beans in rotation. The entire area except for topographically limited portions and non-systems uses must be row crop. Corn dryers and elevator storage systems are good indicators. Often barns are absent except for a machine shed(s). There must be no grain crops or hay. Usually very large fields often with no fence boundaries.
Corn System	A rotation system in which corn and/or beans occupy more than 40%, but less than 100% of the area. The remainder is composed of grain and hay. A small proportion (less than 10%) may be pasture. Usually silos and corn cribs are good indicators of this system. There may also be a complex of barns which indicate feeding of dairy, beef or hogs.
Mixed System	A rotational system composed of grain, corn or beans and hay in roughly equal proportions. No crop dominates the system and fields are generally small. Barns are usually the older type and silos are smaller and less numerous. Associated with a traditional farming system. Sod crops cover more than 20% of the area. Corn and beans together occupy less than 40% of the area.
Grain System	A combination of sod crops and grains in which grain is predominant, occupying more than 85% of the area and in some cases as much as 100%. The field sizes are usually large with fences often absent. A lower intensity cash cropping system. There are no row crops. Good quality hay or pasture may compose up to 15% of the area.

Hay System	A rotational system in which good quality hay and pasture predominate. Very small amounts of corn may be present, typically less than 2 ha. Hay must be the largest proportion of the system.
Pasture System	Sod crops constitute the whole area with little or no rotation. Poor quality weedy hay and/or pasture cover more than 50% of the area. Associated with extensive or unconfined grazing of livestock. There should be minimal evidence of recent cultivation.
Grazing System	Native grass pasture where topography precludes the use of machinery. Usually on poorer land where slopes, rivers, valleys, rock outcrops or shallow soils occur. Most often seen in association with another system.

SPECIALTY AGRICULTURE

Extensive Field Vegetables	Large fields of cucumbers, broccoli, tomatoes, peas, etc. Includes associated fallow or plough-down crops.
Market Gardens/Truck Farms	Small intensive plots of lettuce, carrots, celery and the like. In general, these operations will be less than 12 ha in size and often smaller.
Tobacco System	Tobacco occupies more than 50% of the area, but corn in rotation may occur. Includes associated plough-down or fallow crops.
Nursery	Intensive production of trees, shrubs, vines or flowers for transplant or sale. Includes associated fallow or plough-down crops.

AGRICULTURE CANADA

FIELD CROP SYSTEMS

Row Crops	Continuous cultivation of corn and/or soybeans, without cereal grain or sod rotations. Intensive land use, usually cash crop operations.
Corn-Wheat	Primarily corn and/or soybeans, with cereal grain(s) included as an integral part of the rotation. Clover for hay or seed may be included in the rotation, and small areas of grass hay may be present, but total sod crops constitute less than 20% of total area. Intensive land use, usually cash crop operations.
Mixed	A combination of corn, hay, cereal grain(s) and pasture. A typical field rotation involves: corn, corn, cereals (seeded down), clover for two years or other hay for several years, then back to corn. A certain amount of permanent or rotational pasture may be included. Sod crops cover more than 20% of area. Medium intensity land use; usually full time livestock based operations.
Cereal Grain	Cereal grains only, but may include some fallow land. Mainly winter wheat and barley with some oats or mixed grain. Medium intensity. Very little sod crops.
Hay-Grain	A combination of sod crops and cereal grain(s). The most common rotation involves hay for several years, (clover 1-2, alfalfa-grass mix 2-7), followed by one year of cereals as a cover crop for reseeding of hay. Some permanent or rotational pasture often forms part of the cropping system. Good quality hay and/or cereals constitute more than 50% of the area, and in a few cases cereals constitute 100% of crop area. Medium to low intensity land use, usually part-time livestock based operations or an adjunct to a more intensive operation.

Hay	Sod crops only, with little or no rotation. Poor quality, weedy hay and/or pasture, with minimal evidence of recent cultivation. Livestock production from this system depends primarily on established stands of perennial grass. There may be periodic reseeding of a small portion of the hay, but usually at intervals greater than ten years. Poor quality hay and pasture covers more than 50% of the area. Very low intensity, part-time or hobby farms or an adjunct to a more intensive operation.
Grazing	Native grass pasture where topography precludes the use of machinery. Usually on streambanks, ravines and steep hills. As the least intensive system of agricultural land use, this category only occurs as an adjunct to another system.

SPECIALTY CROPS[1]

Peaches	Primarily tender fruit production, with peaches dominant. Peaches >50%, cherries <20%, vines <20%, remainder with a combination of other fruit.
Cherries	Primarily tender fruit production, with cherries dominant. Cherries >50%, peaches <20%, vines <20%, remainder other fruit.
Peaches-Cherries	Primarily tender fruit production, with peaches and cherries together being dominant. Peaches plus cherries >50%, but neither by itself greater than 50%, vines <20%, remainder other fruit.
Orchard	Primarily hardy fruit production, usually with a combination of pears, plums and apples dominant. Fruit >90%, peaches and/or cherries <50%.

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[1] The specialty crop category shown on the Cropping Systems map refers to any of the crops listed on these pages in this category.

Vineyard	Primarily grape production, with vines >90% of the area.
Orchard-Vineyard	A combination of fruit and grape production usually with hardy fruit dominant. Fruit >40%, but less than 80%, remainder grapes.
Vineyard-Orchard	A combination of grape and fruit production, with grapes dominant. Fruit >40%, but less than 80%, remainder grapes.
Vegetables and Berries	Vegetables, sweet corn and/or berry production, as in market gardening. Includes associated fallow and plough-down crops. Does not include vegetables or berries interplanted with fruit trees.
Nursery	Intensive production of trees, shrubs, vines or flowers, for sale, transplant or seed production. Includes associated fallow or plough-down crops.
Sod	Commercial sod farms.

APPENDIX H

CHARACTERISTICS OF SELECTED FARM ENTERPRISES FOR AGRICULTURAL FIELD CROP SYSTEMS IN NIAGARA REGION

Agricultural Land Use Systems	Capital Investment[1] Total[2] (J=1.00)	Annual Income and Expenses[1] Gross Income[2] (J=1.00)	Operating Expenses[3] (% of Gross Income)	Gross Margin[2] J= (1.00)	Annual Farm Labour[2] Net return/labour Unit (J=1.00)	Predominant Farm Enterprise
Row Crop (J)	1.00	1.00	77.0	1.00	1.00	hogs and cash crop (corn, soy beans)
Corn-wheat (CW)	.54	.41	77.1	.52	.76	cash crops (corn, soy beans, cereals) and hog
Mixed (M)	.76	.34	72.0	.62	.41	dairy, some beef feeder
Cereal Grain (SW)	.71	.30	74.9	.48	.34	cash crop (cereals) some hogs
Hay (H)	.77	.18	109.9	.16	-.06	cow-calf, some hogs, beef feeders and hobby
Pasture (HG)	.97	.30	122.7	-.40	-.53	hobby (cow-calf, horses.

[1] Data were calculated per cultivated hectare for all systems except Pasture (per cultivated + grazing hectare).

[2] Values in 1980 dollars for Row crop are: total capital investments $6,203/ha, income $2,299.88/ha, gross margin 379.01/ha; net return/labour unit $30.56/pd.

[3] Operating expenses include feed, fuel, fertilizer, hired labour, repairs and interest payments.

Source: Huffman, E. and J. Dumanski, Agricultural Land Use Systems - A Refined Approach to Rural Land Use Inventory, Presented at the Agricultural Institute of Canada National Conference, Truro, Nova Scotia, July, 1983, selected from Table 4.

APPENDIX I

RECOGNIZED EXPERTS CONSULTED IN THE DELINEATION OF URBAN SHADOW AREAS IN OWMC CANDIDATE AREAS

1. L.R.G. Martin, School of Urban and Regional Planning, University of Waterloo (December 14, 1983).

2. L.H. Russwurm, Department of Geography, University of Waterloo (December 14, 1983).

3. R.R. Kruegar, Department of Geography, University of Waterloo (December 22, 1983).

4. J.A. Mage, Department of Geography, University of Guelph (December 20, 1983).

5. Professor R.S. Rodd, Agricultural, Agricultural Economics and Extension Education Branch, Univeristy of Guelph - December 5, 1984.

THE MINUTES OF THE MEETINGS ARE ON FILE WITH ECOLOGISTICS LIMITED.

APPENDIX J

OWMC PHASE 3 - FACTOR RANKING FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
Agriculture	Existing Specialty Crops

RISKS:

Not Applicable (N.A.). This facet of factor ranking is not relevant at the constraint mapping stage. Since the portions of landscape being identified during this stage are to accommodate the actual facilities, risk to crops and livestock on lands that would be removed from active agricultural use is irrelevant. However, once potential site areas are identified, risk to crops and livestock on the surrounding farmlands becomes very relevant and will be a factor in comparative evaluations.

IMPACTS:

H - Fugitive emissions could, a) cause plants to react to pollutants in a way that would reduce yields, b) cause consumers to reject any crop that is perceived to be "contaminated", c) cause producers to abandon scarce prime lands for fruit production or, switch to lower value varieties or to other crops. Damage claims and/or insurance costs could be high.

CONFIDENCE:

H - There is a high probability that a facility siting would affect specialty crops that existed in the area. The relative degree of the impact depends on the site conditions, design of the waste treatment facility, and the exact cropping and building characteristics of the farms affected. Accuracy of data on the location of existing specialty crops is high.

OWMC PHASE 3 - FACTOR RANKING FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
Agriculture	B1: Row Crops and corn-wheat systems on Class 1 and 2 Soils

RISKS:

N.A.

IMPACTS:

M-H - Removal of the highest capability land from production - for common field crops.
- crop yield losses and/or livestock reduction.
- alteration of local agricultural land uses and land value.

CONFIDENCE:

M - Use would be considered the most significant impact to the agricultural land base due to the high capability of land affected. The relative degree of impact depends on site conditions, design of the waste treatment facilities, and the exact cropping and building characteristics of the farms affected.

OWMC PHASE 3 - FACTOR RANKING FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR: B2A and B2B : Mixed, cereal-grain, hay-grain and hay (good quality) systems on Class 1 and 2 Soils.
Agriculture	

RISKS:

N.A.

IMPACTS:

M-H - Removal of highest capability land from production of common field crops.
- Same impacts to crops and land uses as B1.
- Hay, grains and mixed crops are potentially more easily replaced at other locations than row crops in B1.
- Possible livestock health problems would require relocation of herds or payment of business losses (damages).

CONFIDENCE:

L-H - High probability of losses incurred to the land base and crop production. Use would be considered the most significant impact to the agricultural land base due to the high capability of the lands. The relative degree of impact depends on site conditions, design of the waste treatment facilities, and the exact cropping and building characteristics of the farms affected.

OWMC PHASE 3 - FACTOR RANKING FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR: B3: Pasture, grazing or hay (poor quality) on Class 1 and 2 Soils.
Agriculture	

RISKS:

N.A.

IMPACTS:

M - Removal of highest capability land from production. Impacts on these field crop systems will be less than B1, B2A and B2B as the cropping systems are less intensive.

CONFIDENCE:

L-H - same as B2A and B2B

OWMC PHASE 3 - FACTOR RANKING FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR: B4: Class 1 and 2 Soils not in use for agricultural production.
Agriculture	

RISKS:

N.A.

IMPACTS:

M-L - Low impact on the agricultural economy as the land is not presently in agricultural use.
- Loss of future agricultural potential.

CONFIDENCE:

H - This is the lowest risk land since no edible food production is involved.
- This area indicates unused agricultural land with a high production potential.

OWMC PHASE 3 - FACTOR RANKING FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR: C1: Row crops and corn-wheat systems on Class 3 and 4 Soils.
Agriculture	

RISKS:

N.A.

IMPACTS:

M-H - Same as B1 land uses.
- Loss of slightly lower capability lands from production.

CONFIDENCE:

M - Significant impact to the better quality agricultural lands. The degree of impact depends on actual site conditions, cropping and building characteristics, and the design of the treatment facilities.

OWMC PHASE 3 - FACTOR RANKING FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR: C2A and C2B: Mixed, cereal grain, hay-grain and hay (good quality) systems on Class 3 and 4 Soils.
Agriculture	

RISKS:

N.A.

IMPACTS:

M - Same as B2A and B2B.
- Loss of lower capability soils.

CONFIDENCE:

L-H - Same as C1.

OWMC PHASE 3 - FACTOR RANKING FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR: C3: hay and grazing systems on Class 3 and 4 soils.
Agriculture	

RISKS:

N.A.

IMPACTS:

M-H - Same as B3.
- Loss of lower capability soils.

CONFIDENCE:

L-H - Same as C1.

OWMC PHASE 3 - FACTOR RANKING FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR: C4: Class 3 & 4 Soils not in use for agricultural production.
Agriculture	

RISKS:

N.A.

IMPACTS:

L - Low impact on the agricultural economy as the land is not presently in agricultural use.
- Loss of future agricultural potential.

CONFIDENCE:

H - This is the lowest risk land since no edible food production is involved. The area indicates unused agricultural land with a relatively high production potential.

OWMC PHASE 3 - FACTOR RANKING FOR IDENTIFICATION OF SITE AREAS

FACTOR GROUPING:	FACTOR:
Agriculture	Class 5 and lower: capability soils.

RISKS:

N.A.

IMPACTS:

L - elimination of land for agricultural purposes.
- potential effect on crop production (yields) from fallout.

CONFIDENCE:

H - Probability of impacts to crops is difficult to measure as forage crop pollution would be the last agricultural use to be recognized as having problems. However, impacts to the food chain could be significant. The degree of impact would depend on existing site conditions and facility characteristics.

APPENDIX K

THE PROCEDURE FOR PREPARING THE AGRICULTURAL CONSTRAINT MAPS

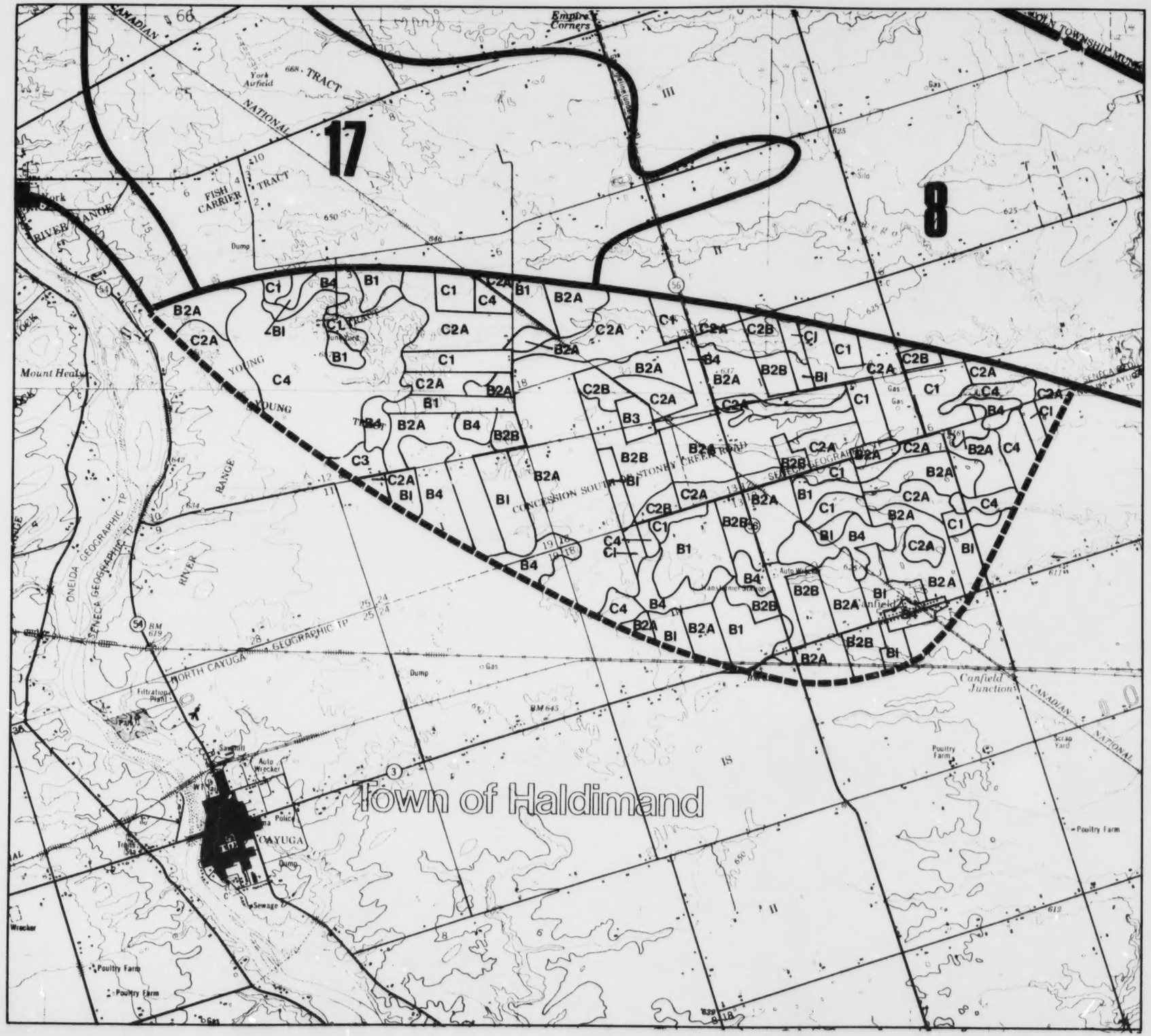
1. The prepared Agricultural Cropping Intensity maps were overlaid on the Soil Capability Maps (1:50,000). A sheet of mylar was placed on top of each combination.

2. Map units were determined according to the following combination of factors:

Factor	Map Category
Existing specialty crops	A
Class 1 or 2 - row crops or corn-wheat	B1
Class 1 or 2 - mixed	B2A
Class 1 or 2 - cereal grain, hay-grain or hay (good quality)	B2B
Class 1 or 2 - pasture, grazing or hay (poor quality)	B3
Class 1 or 2 - non-agricultural use	B4
Class 3 or 4 - row crops or corn-wheat	C1
Class 3 or 4 - mixed	C2A
Class 3 or 4 - cereal grain, hay-grain or hay (good quality)	C2B
Class 3 or 4 - pasture, grazing or hay (poor quality)	C3
Class 3 or 4 - non-agricultural use	C4
Class 5 or lower	D

3. Units of the same combination which are adjacent or in close proximity were grouped, outlined on the mylar overlay, and assigned a map category. Units of less than 20 ha were not identified.

4. The map units were transferred to base maps, reviewed for consistency, and finalized.



OWMC Ontario Waste Management Corporation

Consultant
ecologistics limited
CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

Legend:

	Soil Capability Class	Cropping System
A	any class	specialty crops
B1	1 or 2	row crops or corn-wheat
B2A	1 or 2	mixed
B2B	1 or 2	cereal grain, hay-grain or hay (good quality)
B3	1 or 2	pasture, grazing or hay (poor quality)
B4	1 or 2	non-agricultural use
C1	3 or 4	row crops or corn-wheat
C2A	3 or 4	mixed
C2B	3 or 4	cereal grain, hay-grain or hay (good quality)
C3	3 or 4	pasture, grazing or hay (poor quality)
C4	3 or 4	non-agricultural use
D	5 or lower	any system

Revised Candidate Area Boundary
Candidate Area Boundary
20 Candidate Area Number
Municipal Boundary

Sources / Notes

Ontario Institute of Pedology, 1978, Soils of Cayuga-Canboro; Soils of Blackheath Caistorville 1:25,000, OMAF. Land Resource Research Institute, Agriculture Canada; 1981. Agricultural Land Use Systems Mapping, Regional Municipality of Haldimand/ Norfolk.

1 0 1 mile
2 kilometres 1 0 1000 metres scale 1:50 000

Revised Boundaries Candidate Areas 8 and 17 SITE AREA IDENTIFICATION

October 1984 **APPENDIX L**

APPENDIX M

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF POTENTIAL SITES

FACTOR GROUPING:	FACTOR: Soil Capability
Agriculture	

FACILITY COMPONENTS AFFECTED: All

DEFINITION OF FACTOR:

The predominant Canada Land Inventory Soil Capability (CLI) class for growth of common field crops within each potential site area.

RATIONALE/SIGNIFICANCE:

The capability classes represent the relative potential of the soils to produce common field crops on a long-term basis. Impacts of an OWMC facility siting on the agricultural resource base are potentially higher on lands of better soil capability.

Refer to the Soil Capability for Agriculture Factor Sheet in Appendix D for more details.

SOURCES OF INFORMATION:

1. Updated CLI mapping prepared by Ecologistics Limited in co-operation with the Ontario Institute of Pedology (OIP). Refer to the Soil Capability for Agriculture Factor Sheet in Appendix D for details of mapping sources.

INTERPRETATION/METHODOLOGY:

The site area boundaries were plotted on the updated CLI maps, and the predominant soil capability class determined by visual inspection.

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF POTENTIAL SITES

FACTOR GROUPING:	FACTOR: Soil Capability
Agriculture	

CRITERIA/INDICATORS:

Refer to the Soil Capability for Agriculture Factor Sheet in Appendix D.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

Refer to the Soil Capability for Agriculture Factor Sheet in Appendix D.

The soil capability classes for sites within the map area known previously as 'Welland County' were updated through field mapping along road allowances. Only site areas not designated as industrial were mapped in the field. Information was not needed for the industrially designated sites since they were all considered as potentially good for siting from an agricultural viewpoint, irrespective of soil capability.

The OIP Soil Capability ratings in Table 2-3 were assigned to new soils information obtained by soil sampling.

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF POTENTIAL SITES

FACTOR GROUPING:	FACTOR:
Agriculture	Farm Building Complexes

FACILITY COMPONENTS AFFECTED: All

DEFINITION OF FACTOR:

Farm building complexes include the main barn(s) and associated structures such as storage sheds and silos.

RATIONALE/SIGNIFICANCE:

The nature and condition of the farm building complex is indicative of the degree of current use of and level of investment in the farm operation. The impacts of an OWMC facility siting on the long-term viability of agriculture will be greater in areas with a high infrastructure investment in actively used buildings than in those areas with a lower investment.

SOURCES OF INFORMATION:

Roadside inspection of candidate site areas.

INTERPRETATION/METHODOLOGY:

The use, condition and type of farm building complexes (main barn and associated structures) is the primary indicator of the present activity and investment in the farm infrastructure. The characteristics of farm building complexes were recorded by roadside inspections. The information was interpreted to develop farm-building codes. The number of commercial farm building complexes that are in average or above condition within, or abutting the site area were totalled for each candidate site area.

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF POTENTIAL SITES

FACTOR GROUPING:	FACTOR:
Agriculture	Farm Building Complexes

CRITERIA/INDICATORS:

The following Codes were developed to describe the type and condition of farm building complexes:

A - commerical farm buildings in above-average condition
B - commercial farm buildings in average condition
C - farm buildings in below average condition, (includes buildings which appear to be unused, and/or those in poor condition)
D - hobby and horse farms.

A and B are the building complexes that has the greatest significance in this analysis.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

Land ownership data was not available for the candidate sites. Therefore, it was necessary to assume from airphoto and field inspection which farm building complexes are associated with land parcels that are within, or abut the candidate site areas.

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF POTENTIAL SITES

FACTOR GROUPING:	FACTOR:
Agriculture	Urban Shadow

FACILITY COMPONENTS AFFECTED: All

DEFINITION OF FACTOR:

Those locations in agricultural areas where the pressures of urban-related uses have altered the agricultural land base, infrastructure and/or community sufficiently to de-stabilize the agricultural sector and place its long-term future in doubt.

RATIONALE/SIGNIFICANCE:

The Urban Shadow Areas Factor was used at the constraint mapping stage. Refer to Appendix D for details.

As in the Constraint Mapping Stage, sites within urban shadow areas are considered suitable for further evaluation at the Initial Comparative Evaluation Stage, regardless of the rating of other agricultural factors.

SOURCES OF INFORMATION:

Refer to the Urban Shadow factor sheet in Appendix D.

INTERPRETATION/METHODOLOGY:

Refer to the Urban Shadow factor sheet in Appendix D.

OWMC PHASE 3 - FACTORS FOR IDENTIFICATION OF POTENTIAL SITES

FACTOR GROUPING:	FACTOR:
Agriculture	Designated Industrial and Residual Urban Lands

FACILITY COMPONENTS AFFECTED: All

DEFINITION OF FACTOR: Undeveloped industrial land use designations in Municipal and Regional Official Plans and Residual Urban land designations in Regional Official Plans. The later are undeveloped lands within the urban or hamlet development envelopes defined in Regional Official Plans but not designated for urban uses in area municipality Official Plans.

RATIONALE/SIGNIFICANCE:

Impacts to agriculture from industrial-type uses such as OWMC waste treatment facilities will be lowest on lands already designated for industrial uses.

Those candidate sites on designated industrial and residual urban lands will be considered appropriate for potential sites, regardless of the soil capability class and present agricultural use.

SOURCES OF INFORMATION:

Refer to the factor sheet in Appendix D.

INTERPRETATION/METHODOLOGY:

Refer to the factor sheet in Appendix D.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF POTENTIAL SITES	
FACTOR GROUPING: Agriculture	FACTOR: Public Ownership
FACILITY COMPONENTS AFFECTED: All	
DEFINITION OF FACTOR: Those lands owned by federal, provincial, or municipal agencies.	
RATIONALE/SIGNIFICANCE: Refer to the factor sheet in Appendix D.	
SOURCES OF INFORMATION: Refer to the factor sheet in Appendix D.	
INTERPRETATION/METHODOLOGY: Refer to the factor sheet in Appendix D.	

APPENDIX N

O.W.M.C. AGRICULTURAL IMPACTS STUDY
FIELD INSPECTION FOR IDENTIFICATION OF POTENTIAL SITES

Candidate Site I.D. LF-4N Farm Building I.D. B

Location: On Site: ✓ Adjacent:

Municipality: Glanbrook Conc. 4 Lot 3

Air Photo No.: 78-4309-60-#66

Observer(s): TV, NT Date: Dec. 5/83

Photograph No. P15 Location on Rd. 22 Direction: Looking south

(Record the photograph number and location on the working map.)

1. Farm Building Descriptions

Code buildings and structures on the sheet and the overlay of the corresponding air photo.

	Farm Building Types	Associated Structure(s)	Building Condition
1.	BB	1, 1	C
2.	S		C
3.	CP		A
4.	S		A
5.			
6.			
Other: 7.			

General Comments:

Codes for Farm Building/Structures Descriptions

Building	Code	Description
Storage Shed or outbuilding	S	A small typical structure used for miscellaneous storage use.
Driveshed	D	A gable end canopy type of quonset style building utilized primarily for the storage of machinery.

Building	Code	Description
Bank Barn	BB	A typical 2 storey timber frame building or building complex.
Beef Feedlot	BF	A large main barn with livestock handling and feeding systems.
Dairy Barn	DB	A large main barn with specialization for dairy such as milkhouse, milking parlour, feeding system, etc.
Commercial		A one- or two-storey elongated, generally steel clad, livestock confinement structure for:
	CP	poultry
	CH	hogs
Grain Drying and Storage Complex	GD	An on-farm or commercial grain drying and storage unit using steel or concrete pins, elevator and drying unit.
Greenhouse	GH	A glass or fibreglass structure utilized as a vegetable hothouse or starter area for tobacco or specialized plants.
Miscellaneous	M	Any structure which does not fit into any of the above. Describe the structure in the comments section.
Non-Agricultural	NA	Specify in the comments section.

Associated Structure(s)		
Grain Bin	1	A round steel grain storage bin on a concrete pad or foundation, with or without aeration.
Tower Silo	2	A typical upright round silo of concrete construction or special blue harvestore or sealed silo.
Bunker Silo	3	A typical wood or concrete horizontal style feed storage structure.
Lean-To	4	Any pole or wood frame lean-to style addition or add-on area which is secondary to the main barn structure.

Building Condition

A. large modern building.
B. large older building in good condition, and with significant improvements.
C. large older building with some repairs, in average condition.
D. large older building in poor condition, repair required.

E. small modern building.
F. small older building in good condition, and with significant improvements.
G. small older building with some repairs, in average condition.
H. small older building in poor condition, repairs required.

I. building in disrepair and falling apart.

2. Make a general summary of the type of farm operation. Include an estimate of the condition/quality of the entire operation using:

(-1) below average..(the farm operation has not been maintained or upgraded)

(1) average.....(a well maintained operation with older buildings in good condition)

(+1) above average..(a well maintained operation with new and/or upgraded older buildings)

_____ Cash Crop land (vacant)

_____ Cash Crop farm (improved)

_____ Specialized beef feedlot operation

_____ Specialized poultry operation

_____ Specialized swine operation

_____ Specialized dairy operation

✓ Mixed or general farm - a mixture of livestock and cash cropping with no larger specialized livestock facilities in evidence.

_____ Specialized vegetable farm

_____ Specialized fruit farm

_____ Farm not in operation

_____ Other - (specify) _____

Additional Comments: All steel clad buildings;

General farm with modern poultry building

3. Existing Crops - Within the Candidate Site

Check the code on the sheet and record the code and field boundaries on the mylar overlay.

	Code	Existing Crops
☑	1	Ploughed field - no evidence of previous crop grown, but the land is obviously used for crop production.
☐	2	Corn (either standing crop or corn stubble indicating the previous crop).
☐	3	Winter wheat.
☑	4	Mixed or small grains either standing or stubble evident.
☐	5	Hay(areas cut for hay, silage).
☐	6	Pasture - (improved grazing land).
☐	7	Woodlot.
☐	8	Idle agricultural land - land which has not been worked for more than one year.

	Code	Other Field Crops (specify)
☐	9	_____
☐	10	_____
☐	11	_____
		Fruits and Vegetables
☐	12	Orchard (specify type)_____
☐	13	Vineyard
☐	14	Strawberries
☐	15	Other berries (specify)_____
☐	16	Other fruits (specify)_____
☐	17	Market gardens
☐	18	Vegetables (specify)_____
		Other fruits and vegetables (specify)
☐	19	_____
☐	20	_____
		Nursery Products
☐	21	specify_____
		Crops Adjacent to the Candidate Site
		Identify and record on the mylar overlay specialty crops and idle land located within the buffer area.
☐	22	Idle agricultural land
☐	23	Specialty crops (specify)_____
☐	24	_____
☐	25	_____

4. Record any distinguishing features observed (ie. name on mailbox or barn, for sale signs, etc.).

_____

_____

5. OFFICE CHECKING - with secondary sources

Name:_____ Date:_____

Comments:_____

_____

_____

_____

APPENDIX O

RATING SYSTEM FOR FARM BUILDING COMPLEXES

INTRODUCTION

The classification of farm building complexes was utilized as an indicator of the relative level of investment in farm infrastructure. Since the data sources for this assessment in the site screening and initial comparative evaluation stages were roadside inspection, it was necessary to utilize fairly general criteria in the rating system. More specific criteria can be utilized once on-site inspections are possible.

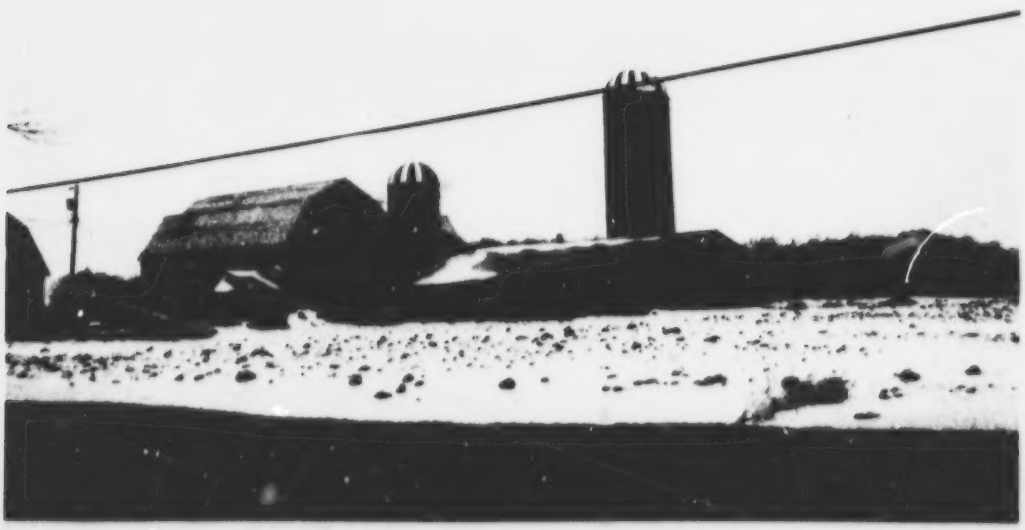
Four classes of farm complexes were created. They represent a range of investment in commercial farming enterprises from high to low:

1. Above average commercial farm building complex.
2. Average commercial farm building complex.
3. Below average farm buildings.
4. Hobby and/or horse farms.

The distinguishing characteristics used in classifying farm building complexes into one of the above classes and photographs of typical buildings in each class are outlined below:

1. Above average commercial farm building complex -

- several large barns in excellent condition
- several large silos or grain bins, where relevant
- evidence of current use of the farm buildings

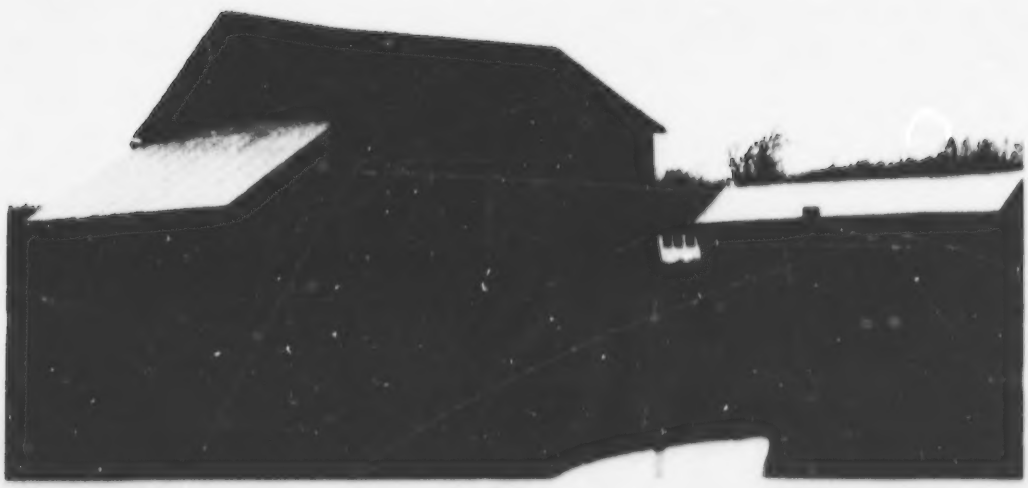


2. Average commercial farm building complex -

- smaller barns in fair to good condition with or without small to medium sized silos or grain bins
- evidence that buildings are in active use

2. Below average farm buildings -

- barns and sheds unused and/or in poor condition with no evidence of recent, major structural repairs
- no evidence of use of barns or sheds for livestock purposes
- may be evidence of use of fields for cropping purposes



4. Hobby and/or horse farms -

- farms which appear to be used primarily for hobby purposes, raising or boarding horses
- most of the land is used for pasture
- farm buildings may be small or large, in good or poor condition

APPENDIX P

FIVE-YEAR AVERAGE VALUE PER HECTARE OF SELECTED CROPS BY COUNTY

Sensitive Crops	$ Value/Hectare		
	Niagara	Haldimand-Norfolk	Hamilton-Wentworth
Soybeans	535	535	570
Sunflowers	n/a	n/a	n/a
Corn for ensilage	575	615	583
Tame hay	330	343	378
Oats for fodder	173	183	188
Other fodder crops	173	183	188
Dry field beans	n/a	n/a	n/a
Asparagus	3120	3120	3120
Beans (wax-green-snap)	3468	3468	3468
Broccoli	5120	5120	5120
Cabbage	5203	5203	5203
Cauliflower	6398	6398	6398
Cucumber	4063	4063	4063
Lettuce	7968	7968	7968
Tomatoes	4298	4298	4298
Apples	3298	3298	3298
Pears	3765	3765	3765
Plums and prunes	3550	3550	3550
Cherry (sweet)	4995	4995	4995
Cherry (sour)	4995	4995	4995
Peaches	4085	4085	4085
Apricots	4150	4090	4000
Strawberries	8383	8383	8383
Grapes	2190	2190	2190
Improved pasture	110	113	125

n/a - not available

Source: Agricultural Statistics for Ontario Publication 20, 1978-82.

Sensitive Crops	$ Value/Hectare		
	Brant	Halton	Peel
Soybeans	625	n/a	535
Sunflowers	n/a	n/a	n/a
Corn for ensilage	588	505	470
Tame hay	373	300	323
Oats for fodder	190	190	188
Other fodder crops	190	190	188
Dry field beans	n/a	n/a	n/a
Asparagus	3120	3120	3120
Beans (wax-green-snap)	3468	3468	3468
Broccoli	5120	5120	5120
Cabbage	5203	5203	5203
Cauliflower	6398	6398	6398
Cucumber	4063	4063	4063
Lettuce	7968	7968	7968
Tomatoes	4298	4298	4298
Apples	3298	3298	3298
Pears	3765	3765	3765
Plums and prunes	3550	3550	3550
Cherry (sweet)	4995	4995	4995
Cherry (sour)	4995	4995	4995
Peaches	4085	4085	4085
Apricots	n/a	n/a	n/a
Strawberries	8383	8383	8383
Grapes	2190	2190	2190
Improved pasture	123	100	108

APPENDIX Q

SENSITIVE CROP AND LIVESTOCK ANALYSIS

Within A 5 km Zone Of An Incinerator

INTEGRATED SITES

SITE #	ENUMERATION AREAS	PROPORTION WITHIN THE 5 km ZONE	SENSITIVE CROP $ VALUE/HA	LIVESTOCK DENSITIES #/40 HA	TOTAL $ VALUE/HA SENSITIVE CROPS	LIVESTOCK #/40 HA
LF-1E	001	0.06	20.33	3302	$ 1.22	198.1
	002 (Niagara)	0.23	56.03	1036	12.89	238.3
	001/051/052	0.02	35.68	2	.71	0.0
	003/010	0.39	43.18	2248	16.84	876.7
	112/151	0.04	33.43	1667	1.34	66.7
	113/114	0.02	108.88	17	2.18	0.3
	002 (Welland)	0.24	45.33	8	10.88	1.9
		1.00			TOTAL $46.06	1382.1
LF-3E	002 (Welland)	0.09	45.33	8	$ 4.08	0.7
	003/010	0.60	43.18	2248	25.91	1348.8
	001	0.08	20.33	3302	1.63	264.2
	002 (Niagara)	0.16	56.03	1036	8.96	165.8
	112/151	0.03	33.43	1667	1.00	50.0
	113/114	0.02	108.88	17	2.18	0.3
	Urban Lands	0.02	0.00	0	0.00	0.0
					TOTAL $43.76	1829.9

INTEGRATED SITES

SITE #	ENUMERATION AREAS	PROPORTION WITHIN THE 5 km ZONE	SENSITIVE CROP $ VALUE/HA	LIVESTOCK DENSITIES #/40 HA	TOTAL $ VALUE/HA SENSITIVE CROPS	TOTAL LIVESTOCK #/40 HA
LF-8C	121	0.05	59.30	131	$ 2.97	6.6
	160	0.04	136.00	4682	5.44	187.3
	163	0.07	835.03	5067	58.45	354.7
	164	0.01	357.30	4238	3.57	42.4
	168/169	0.24	162.00	90	38.88	21.6
	202	0.12	135.95	2075	16.31	249.0
	203	0.04	138.40	2352	5.54	94.1
	204	0.20	138.70	5789	27.74	1157.8
	205	0.18	121.78	4509	21.92	811.6
	206	0.05	190.28	3480	9.51	174.0
		1.00			TOTAL $190.33	3099.0
LF-9C	168/169	0.19	162.00	90	$ 30.78	17.1
	202	0.09	135.95	2075	12.24	186.8
	203	0.08	138.40	2352	11.07	188.2
	204	0.26	138.70	5789	36.06	1505.1
	205	0.22	121.78	4509	26.79	992.0
	206	0.16	190.28	3480	30.44	556.8
		1.00			TOTAL $147.38	3445.8

INTEGRATED SITES

SITE #	ENUMERATION AREAS	PROPORTION WITHIN THE 5 km ZONE	SENSITIVE CROP $ VALUE/HA	LIVESTOCK DENSITIES #/40 HA	TOTAL $ VALUE/HA SENSITIVE CROPS	LIVESTOCK #/40 HA
LF-3C	003	0.05	83.53	308	$ 4.17	15.4
	054	0.02	149.03	65	2.98	1.3
	057	0.02	121.83	327	2.44	6.5
	201	0.05	209.63	2477	10.48	123.9
	202	0.06	135.95	2010	8.16	120.6
	203	0.45	138.40	2075	62.28	1058.4
	204	0.13	138.70	5789	18.03	752.6
	205	0.03	121.78	4509	3.65	135.3
	207	0.06	114.50	4748	6.87	284.9
	208	0.13	210.18	1959	27.32	254.7
		1.00			TOTAL $146.38	2753.6
LF-10W	011	.24	149.70	22	$ 35.93	5.3
	012	.26	194.80	137	50.65	35.6
	019	.09	95.98	177	8.64	15.9
	104	.14	304.98	781	42.70	109.3
	105	.27	120.98	961	32.66	259.5
		1.00			TOTAL $170.58	425.6

INTEGRATED SITES

SITE #	ENUMERATION AREAS	PROPORTION WITHIN THE 5 km ZONE	SENSITIVE CROP $ VALUE/HA	LIVESTOCK DENSITIES #/40 HA	TOTAL $ VALUE/HA SENSITIVE CROPS	TOTAL LIVESTOCK #/40 HA
LF-11W	C*	0.08	62.78	1539	$ 5.02	123.1
	011	0.13	149.70	22	19.46	2.9
	012	0.12	194.80	137	23.38	16.4
	019	0.04	95.98	177	3.84	7.1
	103	0.02	129.65	32	2.59	0.6
	104	0.29	304.98	781	88.44	226.5
	105	0.31	120.98	961	37.50	298.0
	106	0.01	69.90	9423	.70	94.2
		1.00			TOTAL $180.93	768.8
LF-4N	165	0.05	62.63	73	$ 3.13	3.7
	167	0.41	32.10	460	13.16	188.6
	169	0.16	143.93	4686	23.03	749.8
	264	0.16	116.05	42	18.57	6.7
	267/268	0.16	74.16	18	11.87	2.9
	265	0.03	226.43	2399	6.79	72.0
	Urban Land	0.03	0.00	0	.00	0.0
		1.00			TOTAL $ 76.55	1023.7

*C = Enumeration Areas 116, 112, 113, 114

PARTIALLY INTEGRATED SITES

SITE #	ENUMERATION AREAS	PROPORTION WITHIN THE 5 km ZONE	SENSITIVE CROP $ VALUE/HA	LIVESTOCK DENSITIES #/40 HA	TOTAL $ VALUE/HA SENSITIVE CROPS	TOTAL LIVESTOCK #/40 HA
PI-1N	165	0.19	62.63	73	$ 11.90	13.9
	166	0.06	96.60	25	5.79	1.5
	167	0.45	32.10	460	14.45	207.0
	169	0.12	143.93	4686	17.27	562.3
	264	0.09	116.05	42	10.44	3.8
	267/268	0.07	74.16	18	5.19	1.3
	Urban	0.02	0.00	0	0.00	0.0
		1.00			TOTAL $ 65.04	798.8
PI-13N	164	0.21	389.48	11	$ 81.79	2.3
	165	0.45	62.63	73	28.18	32.9
	166	0.26	96.60	25	25.12	6.5
	167	0.08	32.10	460	2.57	36.8
		1.00			TOTAL $137.66	78.5

PARTIALLY INTEGRATED SITES

SITE #	ENUMERATION AREAS	PROPORTION WITHIN THE 5 km ZONE	SENSITIVE CROP $ VALUE/HA	LIVESTOCK DENSITIES #/40 HA	TOTAL $ VALUE/HA SENSITIVE CROPS	TOTAL LIVESTOCK #/40 HA
PI-18E	002 (Niagara)	0.14	56.03	1036	$ 7.84	145.0
	002 (Welland)	0.10	45.33	8	4.53	0.8
	001/051/052	0.28	35.68	2	9.80	0.6
	059	0.05	53.05	3327	2.65	166.4
	062	0.23	33.95	22	7.81	5.1
	Urban	0.20	0.00	0	0.00	0.0
		1.00			TOTAL $32.63	317.9
PI-27E	078	0.03	88.75	21	$ 2.66	0.6
	151/112	0.05	33.43	1667	1.68	83.4
	113/114	0.01	108.88	17	1.09	0.2
	002 (Welland)	0.08	45.33	8	3.63	0.6
	002 (Niagara)	0.13	56.03	1036	7.28	134.7
	001	0.03	20.33	3302	.61	99.1
	Urban	0.07	0.00	0	0.00	0.0
	003/010	0.60	43.18	2248	25.95	1348.8
		1.00			TOTAL $42.90	1667.3

PARTIALLY INTEGRATED SITES

SITE #	ENUMERATION AREAS	PROPORTION WITHIN THE 5 km ZONE	SENSITIVE CROP $ VALUE/HA	LIVESTOCK DENSITIES #/40 HA	TOTAL $ VALUE/HA SENSITIVE CROPS	LIVESTOCK #/40 HA
PI-2W	C	0.31	62.78	1539	$ 19.46	477.1
	103	0.03	129.65	32	3.89	1.0
	104	0.31	304.98	781	94.54	242.1
	105	0.25	120.98	961	30.25	240.3
	106	0.03	69.90	9423	2.10	282.7
	011	0.02	149.70	22	2.99	0.4
	012	0.03	194.80	137	5.84	4.1
	019	0.02	95.98	177	1.92	3.5
		1.00			TOTAL $160.99	1251.2
PI-1A1	301	0.10	118.83	65	$ 11.88	6.5
	302	0.43	46.38	19	19.94	8.0
	303	0.32	81.38	30	26.04	9.6
	Urban	0.15	0.00	0	0.00	0.0
		1.00			TOTAL $ 57.86	24.1

APPENDIX R

INITIAL COMPARATIVE EVALUATION - AGRICULTURAL DATA SUMMARY

	INDICATORS		LF-1E	LF-3E	PI-18E	PI-27E
A.	**Site**					
1	Site Acquisition Area (ha)		253	173	114	171
2	Predominant Land Use Designation(s)		good general agriculture	good general agriculture	heavy industrial	industrial
3	Soil Capability, Class 1 Equivalents (ha)		202	111	73	124
4	Tile Drainage (% of Area)		0	0	0	0
5	Cultivated Land (ha)		141	80	88	112
6	Farm Building Complexes (number)	*A	-	-	-	-
		B	2	1	3	1
		C&D	6	2	-	1
7	Total Land Holdings		25	20	24	12
	No. of holdings <20 ha		19	17	23	7
	No. of non-farm houses		8	8	8	4
8	Public land ownership (% of site owned by public agencies)		0.7	0	3	7
B.	**Vicinity**					
1	Predominant Land Use Designation(s)		good general agriculture	good general agriculture	heavy industrial	industrial
2	Farm Building Complexes (number)	A	-	-	-	1
		B	4	6	1	3
		C&D	5	3	2	-
3	Sensitive Crops - 5 km radius ($/ha)		46	43	32	42
4	Livestock Population - 5 km radius (#/40 ha)		1382	1830	318	1667
5	Predominant Soil Capability Class (km radius)		2	3	3	2

*A - above average commercial farm complex
B - average commercial farm complex
C&D - below average commercial farm complex, hobby or horse farm

	INDICATORS		LF-1C	LF-3C	LF-8C	LF-9C
A.	**Site**					
1	Site Acquisition Area (ha)		145	240	145	120
2	Predominant Land Use Designation(s)		rural[1]	rural	rural	rural
3	Soil Capability, Class 1 Equivalents (ha)		93	165	106	89
4	Tile Drainage (% of Area)		0	0	14	20
5	Cultivated Land (ha)		54	175	144	105
6	Farm Building Complexes (number)	A	-	-	2	-
		B	2	3	2	2
		C&D	1	0	-	0
7	Total Land Holdings		9	13	7	4
	No. of holdings <20 ha		5	6	1	0
	No. of non-farm houses		1	1	4	0
8	Public land ownership (% of site owned by public agencies)		47	0	0	0
B.	**Vicinity**					
1	Predominant Land Use Designation(s)		rural & industrial	rural	rural	rural
2	Farm Building Complexes (number)	A	2	3	4	4
		B	4	7	9	6
		C&D	5	-	1	2
3	Sensitive Crops - 5 km radius ($/ha)		-	146	190	147
4	Livestock Population - 5 km radius (#/40 ha)		-	2754	3099	3446
5	Predominant Soil Capability Class (km radius)		3	2-3	2	2

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[1] Proposed amendment which would change designation to industrial.

	INDICATORS		LF-10W	LF-11W	PI-2W
A.	**Site**				
1	Site Acquisition Area (ha)		267	139	145
2	Predominant Land Use Designation(s)		rural agricultural 1 and 2	agricultural	industrial & agricultural
3	Soil Capability, Class 1 Equivalents (ha)		132	96	77
4	Tile Drainage (% of Area)		0	23	31
5	Cultivated Land (ha)		235	126	129
6	Farm Building Complexes (number)	A	-	-	1
		B	4	1	1
		C&D	2	1	-
7	Total Land Holdings		8	10	11
	No. of holdings <20 ha		2	7	4
	No. of non-farm houses		3	6	3
8	Public land ownership (% of site owned by public agencies)		0	0	30
B.	**Vicinity**				
1	Predominant Land Use Designation(s)		rural agricultural 1 and 2	rural agricultural 1 and 2	agricultural & industrial
2	Farm Building Complexes (number)	A	1	1	1
		B	9	12	0
		C&D	4	8	2
3	Sensitive Crops - 5 km radius ($/ha)		170	180	160
4	Livestock Population - 5 km radius (#/40 ha)		426	769	1251
5	Predominant Soil Capability Class (km radius)		4	3>4	4

	INDICATORS		LF-2N	LF-4N	PI-1N	PI-13N	PI-1A1
A.	**Site**						
1	Site Acquisition Area (ha)		155	160	356	166	129
2	Predominant Land Use Designation(s)		S.P.A.[2]	agri-cultural	agri-cultural	agri-cultural	indus-trial
3	Soil Capability, Class 1 Equivalents (ha)		150	149	325	144	129
4	Tile Drainage (% of Area)		0	0	0	0	0
5	Cultivated Land (ha)		160	123	346	123	91
6	Farm Building Complexes (number)	A	-	-	-	-	-
		B	1	1	-	3	-
		C&D	2	2	5	-	2
7	Total Land Holdings		10	8	25	5	3
	No. of holdings <20 ha		5	4	16	1	1
	No. of non-farm houses		2	3	7	1	3
8	Public land ownership (% of site owned by public agencies)		4	0	0	87	6
B.	**Vicinity**						
1	Predominant Land Use Designation(s)		S.P.A.	agri-cultural	agri-cultural	agri-cultural	rural
2	Farm Building Complexes (number)	A	-	1	-	1	-
		B	3	4	10	5	4
		C&D	4	2	2	3	1
3	Sensitive Crops - 5 km radius ($/ha)		-	76	65	137	57
4	Livestock Population - 5 km radius (#/40 ha)		-	1024	799	79	24
5	Predominant Soil Capability Class (km radius)		1	1	1	1	1

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[2]S.P.A. - Special Policy Area--municipality is in the process of preparing a secondary plan which would redesignate to industrial.

APPENDIX S

SOIL CAPABILITY RATINGS FOR SITES

(hectares)

Site	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Total
LF-1E	58	117	78	-	-	-	253
LF-3E	-	-	173	-	-	-	173
LF-8C	-	83	62	-	-	-	145
LF-9C	-	78	42	-	-	-	120
LF-3C	-	104	104	27	5	-	240
LF-10W	-	35	-	200	-	32	267
LF-11W	42	-	46	51	-	-	139
LF-4N	130	-	30	-	-	-	160
LF-1C	-	-	145	-	-	-	145
LF-2N	134	17	4	-	-	-	155
PI-27E	-	94	77	-	-	-	171
PI-18E	-	-	114	-	-	-	114
PI-2W	-	-	36	109	-	-	145
PI-1N	270	-	86	-	-	-	356
PI-1A1	129	-	-	-	-	-	129
PI-13N	85	52	21	8	-	-	166

APPENDIX T

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: CULTIVATED LAND

FACILITY COMPONENTS AFFECTED: ALL

DEFINITION OF FACTOR:

The relative proportion of land within a candidate site which is under cultivation.

RATIONALE/SIGNIFICANCE:

Impacts to agriculture are greater on sites with a high proportion of land in use for agricultural production than on sites with more idle or non-agricultural land uses.

SOURCES OF INFORMATION:

Agricultural Land Use Systems maps prepared by Agriculture Canada and OMAF.

Refer to the Agricultural Cropping System factor sheet (Appendix D).

INTERPRETATION/METHODOLOGY:

A dot grid overlay will be used to measure acreages of the agricultural cropping systems from the 1:50,000 scale maps.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: CULTIVATED LAND

CRITERIA/INDICATORS:

Cropping systems measured include: row crops, corn-wheat, mixed cereal grain, hay-grain and hay.

Definitions of cropping systems are in Appendix G.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: FARM BUILDING COMPLEXES

FACILITY COMPONENTS AFFECTED: ALL

DEFINITION OF FACTOR:

The complex of barns, silos, sheds, etc. and land improvements which make up the physical base of a farm operation.

RATIONALE/SIGNIFICANCE:

This factor was also used at the Identification of Potential Sites stage. Refer to the factor sheet in Appendix M for details.

SOURCES OF INFORMATION:

The number of average and above average farm building complexes that are either within the candidate site boundaries, or on land holdings that are, in part within the candidate site will be totalled. Holdings to be totalled for the vicinity include any farm unit with land that appears to fall within 1,000 m of an incinerator and/or 500 m from the boundaries of a landfill site.

INTERPRETATION/METHODOLOGY:

As in the Farm Building Complex Factor Sheet in Appendix M.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: URBAN SHADOW

FACILITY COMPONENTS AFFECTED: ALL

DEFINITION OF FACTOR:

The number of land holdings within the candidate site acquisition area which are less than 20 ha (50 acres) in size, plus the number of non-farm residences.

RATIONALE/SIGNIFICANCE:

This information serves as an indicator of the degree of fragmentation of land parcels into small holdings. Small land holdings increase the difficulty of maintaining land is long-term use for commercial agriculture. The number of residences indicates the degree to which the agricultural use of lands may be constrained by conflicts with non-farm residents. The potential effects on the agricultural resource base of a facility siting will be higher where agriculture is the predominant use.

SOURCES OF INFORMATION:

Property boundary information obtained from assessment roles and provided by Marshall, Macklin, Monaghan Ltd. Non-farm residences were identified in the field and supplied by Marshall, Macklin, Monaghan Ltd.

INTERPRETATION/METHODOLOGY:

The number of land holdings less than 20 ha (50 acres) in size and the number of non-farm residences will be totalled for each site acquisition area.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: URBAN SHADOW

CRITERIA/INDICATORS:

1. Non-farm residences will be identified by field inspections.
2. Land holding boundaries will be plotted from assessment role mapping.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: SOIL CAPABILITY

FACILITY COMPONENTS AFFECTED: ALL

DEFINITION OF FACTOR: The acreage of land within site boundaries and along local access roads which is equivalent to the CLI Class 1 Soil Capability. The predominant soil capability class(es) within a 1 km radius of the site.

RATIONALE/SIGNIFICANCE:

The lower the Class 1 equivalent acreage, the lower the potential for agricultural production. The impacts of a facility siting will be the lowest on the site with the smallest Class 1 equivalent acreage. The length of Class 1 equivalent land traversed by local access roads indicates the degree to which the land resource potential will be lost if local roads are widened.

The predominant soil capability class indicates the general potential for agriculture in the site area from a land resources point-of-view. Refer to Soil Capability for Agriculture Factor Sheet in Appendix D for details.

SOURCES OF INFORMATION:

Refer to the Soil Capability for Agriculture factor sheet in Appendix D.

INTERPRETATION/METHODOLOGY:

The acreage of each soil capability class within a site will be measured from the updated Soil Capability maps (1:50,000) Class 1 equivalents are calculated by utilizing a procedure developed by Hoffman (1971) where a capability index is determined for each capability map unit (Appendix F, Step 2). These values are multiplied by the area of the map unit and summed.

In order to calculate the Class 1 soil equivalents traversed by local access roads, the lengths of each soil capability class will be measured on the 1:50,000 Soil Capability maps. For each length, the Class will be converted to a Class 1 equivalent using the Hoffman indices, and the values for each segment summed.

The predominant soil capability class will be identified by visual inspection of the Soil Capability for Agriculture Maps.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: SOIL CAPABILITY

CRITERIA/INDICATORS:

Refer to the Soil Capability for Agriculture factor sheet in Appendix D.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

In the former Welland County portion of the Region of Niagara, soil capability information was upgraded for the non-industrially designated sites. See the Soil Capability factor sheet in Appendix M.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: DESIGNATED LAND USE

FACILITY COMPONENTS AFFECTED: ALL

DEFINITION OF FACTOR:

Land use designations in local and Regional Official Plans.

RATIONALE/SIGNIFICANCE:

Land use designations in Official Plans are indicative of community intentions for future land uses. Lands designated rural or agricultural have a longer term opportunity for agricutural use than lands designated for future industrial and other urban-related uses.

SOURCES OF INFORMATION:

Obtained from local and regional Official Plans and provided by Marshall, Macklin, Monaghan Limited.

INTERPRETATION/METHODOLOGY:

The location of each candidate site area and lands within the 1,000 m radius of the sites (vicinity) will be checked for the land use designation.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: DESIGNATED LAND USE

CRITERIA/INDICATORS:

Agricultural, Rural or Industrial land use designations as defined in local and regional Official Plans.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

Although lands designated for industrial uses may presently be in agricultural uses, they have been officially committed to industrial or other non-agricultural uses for the future.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: SENSITIVE CROPS

FACILITY COMPONENTS AFFECTED: ALL

DEFINITION OF FACTOR:

Crops which are potentially sensitive to accidental emissions from an incinerator or physical/chemical treatment plan that exceed regulation levels and, spills of untreated toxic wastes in transit.

RATIONALE/SIGNIFICANCE: If emissions exceed regulation levels or untreated toxic wastes are spilled in transit, there is a potential for crops to be affected by contaminants which could be introduced into the food chain through human and/or livestock consumption of exposed crops, cause economic loss through yield reductions, and/or consumer reluctance to purchase exposed crops.

SOURCES OF INFORMATION:

1. "Preliminary Assessment of Agricultural Crop Sensitivity to Airborne Emissions" - Ecologistics Background Report.
2. "Environmental Toxicology Report", IEC Beck Ltd. and the Ontario Research Foundation
3. The 1981 Census of Agriculture at the Enumeration Area level.
4. Agricultural Statistics for Ontario Publication 20, Ontario Ministry of Agriculture and Food, 1978-1982.

INTERPRETATION/METHODOLOGY: A crop sensitivity factor was developed to indicate the average value per acre of sensitive crops. Sensitive crops were identified by: utilizing studies which identify the potential range and types of contaminants that might be emitted; identifying crops sensitive to the toxicants; and identifying the presence and value of sensitive crops grown in the study area (Table 4-3). The average value per acre of sensitive crops within the 5 km zone was calculated by the following:

- acreages of sensitive crops were obtained from the 1981 Census of Agriculture on an Enumeration area basis for all E.A.'s that fall within a 5 km wide zone around each incineration site.
- the per acre crop value was calculated for sensitive crops within each E.A. based on a 5 year average value per acre.
- A weighted per acre value was estimated for the 5 km zone according to the proportion of the zone occupied by each E.A. The value of crops within the 2 km band centred on access roads was calculated by multiplying the average per acre value of the sensitive crops in each E.A. by the number of areas in each E.A. segment. The value of each road segment was summed to obtain a total value for each access road.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: SENSITIVE CROPS

CRITERIA/INDICATORS:

The per acre value of sensitive crops within the 5 km zone of the incinerator sites and within a 2 km band centred on access roads.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

There is a limited precedence for using this factor in a site selection process. The crop sensitivity factor was specifically developed for this study.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: LIVESTOCK DENSITIES

FACILITY COMPONENTS AFFECTED: ALL

DEFINITION OF FACTOR:

The number of dairy, beef cattle, hogs, chickens and turkeys per 100 acres of farmland within the vicinity of an incinerator.

RATIONALE/SIGNIFICANCE:

This factor will indicate the relative sensitivity of livestock and poultry to accidental emissions from an incinerator that exceed regulation levels. Also, concerns have been expressed by OWMC workshop participants and agricultural groups about the safety of livestock and poultry in the vicinity of an incinerator and human consumption of contaminated livestock. Incinerator sites with the lowest livestock densities in the vicinity of the site are preferred.

SOURCES OF INFORMATION:

The 1981 Census of Agriculture at the Enumeration Area level.

INTERPRETATION/METHODOLOGY:

The livestock density in a 5 km zone around incinerator sites will be calculated according to the following:

- the number of dairy and beef cattle, hogs, chickens and turkeys per 100 acres of farmland will be obtained from the 1981 Census of Agriculture and summed for each E.A. within the 5 km zone
- an average density for each 5 km zone will be obtained by multiplying the total number of livestock in each E.A. by the proportion of the zone that it occupies.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: LIVESTOCK DENSITIES

CRITERIA/INDICATORS:

The total number of dairy and beef cattle, hogs, chickens and turkeys per 100 acres of farmland within a 5 km zone of each incinerator site.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

The livestock density factor was developed specifically for this study.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: ACTIVE FARM BUILDING COMPLEXES

FACILITY COMPONENTS AFFECTED: ALL

DEFINITION OF FACTOR:

The number of active farm complexes along access roads.

RATIONALE/SIGNIFICANCE:

Indicates the degree of potential conflict between truck movements and movement of farm machinery. Sites with access roads that have the fewest number of active farm complexes are preferred.

SOURCES OF INFORMATION:

Roadside inspection of access roads.

INTERPRETATION/METHODOLOGY:

Active farm complexes will be identified by field inspection, located on 1:10,000 maps, and totalled for both local and regional access roads for each candidate site.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: ACTIVE FARM BUILDING COMPLEXES

CRITERIA/INDICATORS:

Farm building complexes which have evidence of being actively used (i.e. machinery, livestock present)

COMMENTS/ASSUMPTIONS/LIMITATIONS:

Active farm building complexes will be identified by visual inspection.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: LIVESTOCK POPULATIONS

FACILITY COMPONENTS AFFECTED: ALL

DEFINITION OF FACTOR:

The population of livestock and poultry within a 2 km wide band centred on the regional and local access roads.

RATIONALE/SIGNIFICANCE:

This provides a relative measure of the risk to livestock and poultry, and the food chain due to accidental spills of untreated toxic materials in transit. These materials could affect the health and/or economic value of livestock and poultry that come into contact with them.

SOURCES OF INFORMATION:

The 1981 Census of Agriculture at the Enumeration Area level.

INTERPRETATION/METHODOLOGY:

In order to estimate the livestock populations in a 2 km band along the length of the access roads, the population for each enumeration area affected will be obtained by multiplying the number of livestock per acre by the number of acres in the 2 km wide bank.

OWMC - PHASE 3 - FACTORS FOR IDENTIFICATION OF CANDIDATE SITES

FACTOR GROUPING: AGRICULTURE	FACTOR: LIVESTOCK POPULATIONS

CRITERIA/INDICATORS:

The livestock population is the total number of dairy, beef cattle, hogs, poultry and turkeys per acre.

COMMENTS/ASSUMPTIONS/LIMITATIONS:

POOR

QUALITY

ORIGINAL